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ABSTRACT

The conference described in this document featured keynote addresses, two workshops, symposia, and contributed presentations. This document contains the extended abstracts of the conference presentations, and symposia. Topics of the papers and symposia of this conference cover the areas of: (1) the relationship between environmental education and science, technology, and society; (2) networking in environmental education; (3) environmental education in general education; and (4) international environmental education. Workshop topics include elementary and secondary curricula, and nonformal education. In instances where an extended abstract was not submitted, the short abstract from the conference program was included in order to provide a complete record of the conference. An author list of 45 names is provided. (CW)

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Building Multicultural Webs Through Environmental Education

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BUILDING MULTICULTURAL WEBS THROUGH ENVIRONMENTAL EDUCATION

1988 Conference Proceedings

Selected Papers from the Seventeenth Annual
Conference of
The North American Association for
Environmental Education

Held at the
Crowne Plaza Hotel
Orlando, Florida

October 14-19, 1988

Edited by

Louis A. Iozzi
Clint L. Shepard

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PREFACE

"Building Multi-cultural Webs through Environmental Education" was the theme of the Seventeenth Annual Conference of the North American Association for Environmental Education (NAEE). Orlando, Florida, a multi-cultural city, was the site of the conference held from October 14 through October 18, 1988 at the Crowne Plaza Hotel.

The Conference offered many opportunities to learn about the current impacts of environmental education activities including: featured speakers, symposia and contributed papers. Each of NAEE's three sections--Non-Formal Education, Elementary and Secondary Education,and Environmental Studies--conducted workshops to stimulate its members. Field trips, an auction and a special environmental concert completed the conference program.

The League of Environmental Educators in Florida (LEEF) served as the cosponsors for the 1988 Conference. The successful partnership of NAEE and LEEF fosters a continuing affiliation between these organizations.

This volume attempts to present a complete account of the 1988 Conference activities. Contained in various sections are reports of Section Workshops; Symposia; Contributed Papers; and Keynote Speakers. The Contributed Papers are arranged alphabetically by author. To comply with space limitations some papers may have been edited. Lengthier documents are available from the author and is so noted at the end of the paper. In cases where an extended paper was not submitted, the short abstract from the conference program has been included. The full conference program is available from NAEE Headquarters.

The editors wish to thank Fran Patton, Florida 4-H Department, for her help in preparation of the final manuscript, and acknowledge the staff and volunteers of NAEE Headquarters, Troy, Ohio for their commitment and dedication to this volume.

Louis A. Iozzi
Clint L. Shepard
Editors

WELCOMING REMARKS

Louis A. Iozzi, Conference Chairman
and President-Elect, NAEE
Rutgers University
New Brunswick, New Jersey

I am delighted to welcome you to beautiful, exciting, Orlando, Florida and the 17th Annual Conference of the North American Association for Environmental Education, It's hard to believe that a year has gone by since I first met with a small group of volunteers in Quebec, Canada to begin planning for a conference that then seemed to be so far away--October, 1988. During the past year, so many people worked so long and so hard to organize what I believe will be the best EE conference we have ever had. Clint Shepard (Program), Pat Burkett (Local Arrangements), and Rudy Schafer (Special Events) agreed, without hesitation, to chair the three critically important "super" committees. Add the wisdom and advice from NAEE President Ed McCrea and the superb support and leadership from Joan Heidelberg and the central staff, and you have what I consider to be my most important contribution to this conference: I put together an extraordinary, highly competent, and professional team! I am deeply indebted to each of them and to the many members of their committees.

Problems are very common when anyone tries to organize a conference of this magnitude. However, the collective contributions of the many committee members have resolved just about all of the significant problems. The only major problem remaining awaits YOUR attention: the problem of selecting from among the many options, those activities and events you will attend.

As you participate in this year's conference, you will see many familiar activities which I like to think of as the "old standards"--those events that have proven to be popular year after year. These include the Author's Corner, Consultant's Bureau, Exhibit Fair, Publisher's Fair, Curriculum Review Fair, Job Mart, Film and Video Festival, and the very popular Environmental Auction. This year, we have added two additional activities which I am particularly excited about: the photography contest and our "environmental concert". I'm sure that these two new events will add even more interest, excitement and enjoyment to our conference.

More than 130 papers will be presented at this conference. The new addition here will be the "Interact Sessions"--sessions in which you can meet "one-on-one" with the authors or presenters to discuss and/or ask questions about their work.

I'm very excited about this year's program and I am sure that you will find our conference to be both a professionally and personally rewarding experience. So, renew old acquaintances, make new friends, participate in the many events and activities and simply ENJOY all that the NAEE and sunny Florida have to offer.

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Clint L. Shepard, Program Chair, NAEE

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SECTION WORKSHOPS

I. SECTION WORKSHOPS

ELEMENTARY AND SECONDARY EDUCATION SECTION

"Curriculum Workshop for Teachers: Focus on Water Resources and Integrating Project WILD Aquatic Program"

Workshop presenters: Ron Gardella, Science and Environmental Education, Northern Kentucky University; Cheryl Charles, Director, Project WILD; Bob Samples, Director, Development of Project WILD Aquatic Materials; John Ramsey, Science and Environmental Education Center, Southern Illinois University.

The ESES section pre-conference workshop was an attempt to provide a curriculum workshop that would bring the expertise of NAEE to a group of teachers on a pressing environmental topic. To this end, the workshop was designed to provide supportive experiences before the conference to assist educators in outlining a unit on an environmental topic and use the wealth of resources offered by the conference to further their efforts. A summary and evaluative meeting scheduled later in the conference would serve to evaluate the process.

Water Resources, Problems, and Issues was chosen as the environmental topic for the workshop. This was reported as being a leading environmental issue in Florida, the conference site, and relevant to any potential participant. Indeed, oil/brine impacts, groundwater contamination, wetland loss, pollution-caused fish kills, drought, fishing practices, and recreational-use impairment are but a few of the local, national, and international water-related problems participants could address.

It was further proposed to provide a context that would accommodate what research tells us teachers do when developing environmental education instructional materials. Thus, the workshop proposed to generally inform participants about environmental education curriculum, provide mechanisms to sort them, provide curriculum materials they could use, and offer two different environmental instructional programs that could serve as models.

Fifteen participants registered for the workshop and ten attended. They represented Barbados, Bhutan, Canada, and the United States (Florida, and Missouri). Their interests and reasons for taking the workshop were to be better informed about environmental education classroom materials and teaching strategies, ways to incorporate EE in their individual teaching and into existing school-wide, state and national curriculum programs.

The workshop began with sharing the workshop rationale and the objectives and tasks that follow:

a. To bring a group of practicing teacher/educators together at an annual conference who were interested in developing an instructional unit about Water.

b. To provide instructional resources and examples of curriculum models for the participants to use.

c. To provide an overview of the status of environmental education curriculum development.

d. To provide training in Project WILD Aquatic and a leading environmental issue and action instructional program as models and resources for a unit.

e. To provide a mechanism to assess and sort instructional resources in order to develop an instructional unit that is sensitive to the goals of environmental education.

f. To facilitate the use of the conference as a resource in the development of an instructional unit.

g. To provide consultants for workshop participants during the conference and to assist the participants in developing their units.

h. To evaluate the process at the end of the conference in a seminar open to any conference participants where workshop participants will share their experiences.

Ron Gardella opened the workshop with an overview on the status and nature of environmental education curriculum reported in the research. Among his comments, he noted that current environmental education curriculum is varied, ranging from nature study to sophisticated strategies for teaching students to investigate environmental issues. In addition, curriculum materials are reported to be developed locally by practicing teacher/educators, generally have a specific topic focus such as biology or ecology, reflect a lot of borrowing, and are not commercially available. Beyond this, the majority of curriculum materials teach knowledge and awareness but do not address environmental action. While a limited number of curriculum efforts may have students involved with environmental action as a group, they tend not to teach the information and skills necessary for them to autonomously take environmental action. Generally viewed, current environmental education materials are not balanced with respect to the goals of environmental education such as knowledge, awareness, investigative skills, and action.

The Environmental Education Curriculum Inventory was then presented and explained. It is an instrument that assesses the degree to which curriculum materials address the goals of environmental education. It was offered as a mechanism to sort and match existing environmental education curriculum materials. Completed samples of curriculum programs and materials evaluated by the inventory were provided and discussed, noting how materials that emphasize different goals could be combined to provide a total balanced program.

John Ramsey later provided a detailed overview and led a discussion on one of the designated national curriculum models. "Investigating and Evaluating Environmental Issues and Actions Skill Development Modules". He noted that this program was one of the few existing curriculum models that offer a sequenced process of training students with respect to the information and skills necessary to identify, investigate, and personally take environmental action. He supported his description of the program and outcomes with current research and examples from practicing teacher-classrooms that did indeed document the autonomous positive environmental actions of students completing the program.

The remainder of the workshop involved the second national curriculum model and newly developed Project WILD Aquatic program. It included a six-hour Project WILD Aquatic workshop cooperatively taught by Cheryl Charles and Bob Samples. Participants were personally involved and experienced a number of WILD Aquatic lessons that exemplified the range of aquatic dimensions of wildlife contained in the program. They completed specific activities that involved combining WILD Aquatic lessons in a sequenced way to develop an instructional unit around a water resource theme. In addition, they were shown how the WILD Aquatic program could address the variety of learning styles of their students and also teach environmental knowledge, skills, awareness, and action in an involved and exciting way. The participants received a copy of the WILD Aquatic manual upon completion of the workshop.

Thirty-six separate conference items were highlighted as potential resources for participants to use with their task during the remainder of the conference. These included a large number of scheduled presentations and conference offerings such as the Consultants' Bureau, Curriculum Review Fair, Film and Video Festival, and Publisher's Fair.

The post workshop evaluation/seminar was held on the last day of the conference. Participants completed a workshop evaluation form that allowed them to evaluate the workshop on a five point scale that listed (1) Poor through (5) Excellent. The Overall Evaluation of the workshop was Very Good to Excellent (4.5). Workshop Organization and Presentations were evaluated at a similar level (4.5). Resources Provided and Assistance With the Unit were evaluated as Very Good (4.0). Individual comments and discussion described the workshop as personally valuable by a number of participants. No suggestions for improvement were noted beyond that of offering a curriculum workshop specifically designed for environmental education curriculum supervisors or leaders.

This workshop was the first attempt to offer a pre-conference workshop and have the entire conference subsequently serve as a workshop resource. It was a productive experience for all involved. Its success is a tribute to the hard work and dedication of all those involved with the effort.

NONFORMAL EDUCATION SECTION

ENVIRONMENTAL ETHICS: STRATEGIES FOR IMPLEMENTATION

Workshop Presentors: Martha Monroe, University of Michigan
Gary Varner, Washington University
Charles Yaple, SUNY at Cortland

The NonFormal Section of NAEE held a conference workshop October 14-15, 1988 in Orlando. Forty-five participants attended from throughout North America, as well as educators from Brazil and Denmark.

The workshop was designed to present a framework for discussing the variety of perspectives of environmental ethics, to explore the use of these sometimes conflicting views in matters of environmental policy, to analyze our personal "ethic" and resulting lifestyle decisions, and through this lens, to evaluate published environmental education curriculum materials and activities. At each stage of the workshop, participants freely entered into discussion, sometimes quite lively, using the framework and wrestling with the implications and consequences of each philosophical stance. In addition to the two keynote presentations summarized here, the workshop involved participants in policy-related activities exploring the opportunity for an ethical message with a Minnesota DNR policy "Roadsides for Wildlife" and debating the moral consequences of saving a stranded bison in Yellowstone National Park. Several other activities appropriate for students were demonstrated as well.

The workshop embodied a great deal of energy and enthusiasm that cannot be captured here. Discussions about environmental ethics continued over meals throughout the conference, and some individuals found the opportunity to clarify their personal ethical views a significant revelation.

Workshop participants received a booklet compiled by the workshop leaders of activities that can be used with groups to help them explore various ethical perspectives, two annotated bibliographies of resources in environmental ethics and the environmental education curriculum materials that were evaluated for their ethical message, the keynote presentations, and relevant articles.

The Role of Environmental Ethics in Environmental Education

During the Friday evening portion of the workshop, Gary Varner, an environmental philosopher currently teaching at Washington University in St. Louis, briefly described four basic types of environmental ethics which philosophers have identified. The views are:

1) Anthropocentrism, according to which only the interests of human beings matter (examples: William Baxter, John Passmore).

2) Sentientism (or the "animal rights" perspective), according to which the interests of all sentient creatures ought to be taken into consideration in making environmental decisions (examples: Peter Singer, Tom Regan).

3) Biocentric individualism, according to which every individual living organism has interests which ought to be taken into consideration (examples: Albert Schweitzer, Paul Taylor).

4) Holism, according to which the welfare of the biotic community (or ecosystem) taken as a whole ought to be the decisive factor when making environmental decisions (examples: Aldo Leopold, the Deep Ecologists).

Varner then facilitated an animated and sometimes heated discussion of such questions as, "Aren't the conclusions of an 'enlightened' form of anthropocentrism equivalent to those of holism?" and "Can people ever be moved by anything but anthropocentric reasons?" In the course of this discussion, Varner described the differences among:

5) a narrow anthropocentrism, according to which all relevant harms and benefits can be adequately captured by a traditional economic analysis,

6) a self-effacing anthropocentrism of the kind apparently advocated by Aldo Leopold (Varner interpreted Leopold as arguing that for enlightened anthropocentric reasons we need to stop thinking like anthropocentrists and to start thinking like holists by living the land (our biotic community) itself, which could be compared to arguing that self-love ultimately requires one to love someone besides oneself),

7) a pure holism, according to which the welfare of the biotic community is the only consideration, and

8) a pluralistic holism, according to which things other than the welfare of the biotic community are also relevant (e.g. the rights of individual humans and/or some non-human animals).

Varner concluded his presentation by summarizing five reasons environmental educators should study theories of environmental ethics.

i) Environmental issues are debated and decided on a daily basis from one or more of these viewpoints. Authoritative bodies commonly make decisions on purely anthropocentric grounds, while non-anthropocentric challenges to these decisions are often dismissed out of hand. If alternative ethical viewpoints are to receive serious consideration in environmental debates, the public must be sensitized to them. Including a study of environmental ethics in environmental education curricula would further this goal.

ii) The four viewpoints sometimes conflict sharply. Although representatives of divergent moral frameworks can agree on certain environmental policies (for instance, reducing pollution is, up to a point, good for people, animals, plants, and ecosystems), on some prominent environmental issues they diverge decisively. For instance, the deep ecologists(who approach environmental issues from a radically holistic stance) differ sharply from the anthropocentrists (even the more "enlightened" ones) about the degree to which we ought to share the earth with its non-human inhabitants.

iii) *Ultimately, one view may be more adequate than another* (in the sense of producing attitudes and correlated action tendencies which will more adequately protect and enhance the natural environment). A recurrent theme of the environmental literature has been that only the adoption of a non-anthropocentric ethical perspective will save us from ecological catastrophe. Leopold pressed this point when he wrote, "It is inconceivable to me that an ethical relation to land can exist without love, respect, and admiration for land." We must, he thought, learn to love the land itself; love of our fellow human beings will not preserve the land. Whether or not such moral evolution is the *only* thing that will save us from catastrophe, it would seem that environmental reform will be pursued with greater vigor in a non-anthropocentric culture.

Each of the preceding points had been raised in the course of the discussion Friday night. The following two points anticipated Saturday's activities.

iv) *Curricular materials may be subtly biased toward anthropocentrism or may simply ignore the alternatives to it*. Some of the most popular curricula are subtly biased toward the anthropocentric perspective, or are otherwise deficient. Some avoid the kinds of conflicts described above, and others simply inculcate values without also teaching students the kinds of intellectual skills they need to deal intelligently with the above kinds of conflicts.

v) *Educators themselves may be teaching from one perspective while hoping for students to develop another*. If the curriculum one is using is biased toward the anthropocentric perspective, an educator may find that they are reinforcing that view, even if they think it is important to teach the alternatives to it.

Which Environmental Ethic Are We Teaching?

Martha Monroe, from the faculty of the University of Wisconsin-Stevens Point, and currently at the University of Michigan, reviewed environmental education curricula through the single lens of environmental ethics on Saturday. The presentation began with several assumptions: 1) that introducing non-anthropocentric views into mainstream culture could be useful in resolving environmental issues, and 2) that education can facilitate social change. There were also two disclaimers: 1) that much of the weakness suggested in environmental education curricula is not a fault, per se, as the materials were probably not designed to meet this single objective in environmental education, and 2) that broad generalizations will be made of the resources as examples of different points, not as claims for the entire manual.

Because a goal of environmental education is to foster a "new ethic" that respects all elements of life on earth (*World Conservation Strategy*, 1980), a variety of current environmental education curricula were reviewed by asking, **Does this curriculum foster in the student a sense of respect and responsibility for the environment and build an understanding that nature has**

value independent of human uses for it? Environmental education curricula appear to fall into five broad categories:

I. The Information Emphasis where common resources like Ten Minute Field Trips, Reasons for Seasons, Small Creatures, and The Curious Naturalist convey information about the world through factual descriptions and activities. Still, an ethic about the world may still come through the cover of "facts." When communicating to youngsters, there is a tendency to make the information interesting and relevant to them. As egocentric beings, children see most of the world anthropocentrically. Consequently, in the absence of a specific ethical vision, teachers explain that information is "important to learn" for reasons that demonstrate personal benefit to the student. This default explanation implies that the world is here for us to benefit from and use.

II. The Conservation Emphasis dominates the older curricular materials, such as Trees in the Examining Your Environment Series, with a more blatantly anthropocentric view. This manual is organized to first teach students how to measure trees (Chapter 1) in order to calculate the amount of lumber we could harvest from them (Chapter 2). Chapters 3-8 teach students about tree physiology in preparation for dissecting one (Chapter 9). Other values of trees, to humans and other creatures, are neglected. In general, the materials that were written in the conservation education era have an anthropocentric orientation; students should learn about the earth's resources so they can be wisely managed for people to use.

In another example, Conserving Soil includes an activity to understand five different reasons for caring about soil. Each is defined, however, only in terms of what is good for humans. Slopes should be protected, for example, not because eroded soil silts waterways and reduces the productivity of the system from whence it came, but because bare slopes are ugly to look at.

III. The Issue Emphasis Toward Behavior Change is found in curricula that teach students information about environmental issues and try to convey behavioral changes that breed a "new ethic." Although the rationale for change usually is anthropocentric in the final analysis, it is a long term, or enlightened anthropocentrism: taking care of the earth now so that there will be resources for future humans. Some examples are Global 2000, Food First, and other global resources that ask students to contemplate the place of Americans in world affairs, and our right to a greater share of the earth's resources than other people get.

IV. The Appreciation Emphasis is used in materials that don't rely on information at all to share their message, but instead use the affective domain to impress a sense of wonder, a magic, and an appreciation of the natural world on young students. Growing Up Green, Acclimatization, and Acclimatizing are good examples of resources that plant the seeds of a non-anthropocentric ethic by involving students in a celebration of the natural world without any predetermined benefit for humans.

V. The Value of Nature Emphasis can be found in more recent materials that convey a rationale for learning and caring about the environment that includes benefits to the system and to individual organisms as well as to humans. Ethical responsibilities for the consequences of our actions are a common theme. The introduction of Wading into Wetlands, a Nature Scope issue states, "By exploring bogs, swamps, and marshes, your kids can see firsthand why these natural areas are so important to wildlife--and to people." In Project WILD, activities may present the value of earthworms ("Eco-Enrichers") to the ecosystem. In these cases, students are beginning to understand and value the environment within a long-term and more holistic framework.

Care should be taken to be certain that our intent in teaching an environmental ethic is actually provided in particular activities. Several activities in Project WILD refer to an objective that speaks to the intrinsic value of animals, for example, but involve students in writing a journal, making a kite, or viewing museum art. In each case the value of the animal is clearly for humans, not intrinsic. Perhaps creative teachers are able to extend certain activities in directions that are not obvious from the written description.

Without advocating one ethic over another, the following goals are suggested as a starting point for the discussion of an appropriate niche for environmental ethics in environmental education:

1. Sensitize students to the wonder and magic of the natural world at an early age,

2. Expose students to alternate views of valuing the environment,

3. Explore the consequences of these various views, legitimizing them in the process of discussion, and

4. Debate, discuss, use, and apply these various views to real cases and policy issues.

SYMPOSIA

SYMPOSIUM I

WORKING TOGETHER: ESTABLISHING A COOPERATIVE RELATIONSHIP BETWEEN NAEE AND NASTS

James D. Lubbers, Coordinator

The Science-Technology-Society trend in education and the newly formed National Association for Science, Technology and Society (NASTS) provide an excellent opportunity to develop a cooperative relationship in working toward those goals common to both the EE community and the STS community. The "STS: theme in education has developed over the last ten years or so to more accurately reflect and meet the needs of people living in a world that is increasingly dominated by a complex technological life-support system. Environmental education has developed as an effort to help people recognize that "NATURE" is the ultimate life support system. Clearly, we need both systems and any training in decision making must emphasize an appropriate balance between meeting human needs and meeting environmental needs.

Issues such as acid rain, deforestation, carbon dioxide levels and other global changes are causing people to finally realize the trade-offs involved with our technological lifestyle and the significance of the decisions presented by such issues. Either humans will begin to make their own decisions to limit growth, or NATURE will make them for us.

Improving awareness and understanding of the factors involved in these types of decisions is an important common goal for educators in both environmental and STS education. It is imperative that all efforts be in harmony with each other and that everyone does their part to ensure efficiency and progress toward building a sustainable society with a sustainable future.

Given the rationale stated above, the objectives of the panelists participating in this symposium include the following:

1. Provide interpretations of the STS movement in education and an overview of the newly formed NASTS.

2. Explain perceived similarities and differences in the goals and mission of EE and STS education in order to identify concerns common to both organizations.

3. Attempt to define avenues of mutual interest, opportunity and communication as an initial step toward a harmonious, cooperative relationship between NAEE and NASTS constituents.

In the brief statements that follow, each panelist presents a summary of his or her unique perspective on the connections between environmental education and STS education. James D. Lubbers suggests a model for understanding interactions with technology in the first paper. Next, "the presidents speak." NAEE President-Elect Louis A. Iozzi and Rustum Roy, NASTS President, each offer their views on the relationship between EE and STS. Trudi L. Volk then offers a well documented comparison of the goals for both areas, describing the common factor of citizenship preparation. To finish, Terry L. Wilson and John F. Disinger follow with reports of separate studies which have important implications for people involved in EE and STS.

THE TWO FACES OF TECHNOLOGY

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Helping individuals understand the role technology plays in the human inhabitation of planet Earth should be a significant part of formal education. Organizations such as NASTS and NAEE are in the forefront of educational reform in meeting this important goal. Educators representing these associations share a common world view and they need a common educational framework into which the many and varied perspectives can be incorporated.

The goal stated above implies a world view that provides the structure we need. Imagine for a moment, a human population without any form of technology. By doing that, it becomes clear that "technology," in all its manifestations, represents the very nature of human existence. Throughout history, technology has enabled humans to overcome limits and will continue to do so. But there is a price to pay. Taking a lesson from ecology, 'there is no such thing as a free lunch,' for every benefit there is a trade-off. Taking a lesson from economics, the benefits and the trade-offs must balance out in the end. The success of continuing human survival depends upon maintaining this balance. Since humans are interdependent with each other, with technology, and with the global ecosystem, not maintaining this balance will result in continuing deterioration of the human habitat.

Central to the development of this world view is the ability of the individual to weigh the benefits and trade-offs of any interaction with technology. Depending on one's understanding of, opportunity to interact with, and ability to control technology, making decisions about technologies that clearly promote survival or clearly limit survival pose few problems for the rational mind. But, for the most part, the interaction is not clearly positive or negative, the benefits are taken for granted, and conscious decisions are not made. Therefore, to promote a world view of balanced benefits and trade-offs, individuals need a system whereby they can make rational, informed decisions about interacting with the many forms of technology common to everyday existence.

A model of the world that reflects a balance between benefits and trade-offs is useful for helping individuals assess the inputs and outcomes of individual interaction with technology. This structure is best described with an example. The three main components can be defined as awareness, action and assessment, the interplay of which denote the complexity of an interaction with technology. Each successive interaction of the same type will reinforce the awareness and assessment of the "action." The example of "The Environmentalist's Diet" explains this structure for eating a meal, but most any interaction could be described by a comparable series of steps.

The Environmentalist's Diet

EVERY TIME YOU EAT...

1. Bless everyone who helped make your meal possible.

2. Look at your plate of food and imagine yourself in charge of strip mining or quarrying.

3. Contemplate all the forms of technology used to produce, process, package, deliver and prepare your meal.

4. Think about the calories of energy needed to get the food to your plate.

5. Consider the impact of pesticides (other than those on your plate) that leach into irrigation drainwater used to maintain wetlands that provide food to sustain migrating shorebirds en route to their breeding grounds.

6. Determine your average trophic level (ATL).
   Consider the advantages of lowering your ATL.

PAUSE, FEEL GUILTY, EAT, THEN...

7. Imagine not knowing where your next meal is coming from.

8. Think about the garbage, trash, and dirty dishwater generated by your meal.

9. Bless your local wastewater treatment plant operators and thank them for the dried sludge you can buy to fertilize your garden so you can grow your own vegetables in order to avoid items 3, 4 and 5, and enjoy #6.

CLEAN YOUR PLATE!

In this example, the benefits of eating a meal are obvious. Most people need to be reminded of the other "face" of technology. That is, individuals need an increased awareness of the enabling systems and need to assess the consequences of everything we do. Even through the issues presented in each step may seem one-sided, many of them can be interpreted positively or negatively. If this strategy is employed every time the individual eats a meal, it could lead to changes in behaviors. More types of interactions and perhaps variations in this strategy could be added over time or may correspond with intellectual development during the years of formal education. Also, there are many different scales, in both time and space, to help define and categorize interactions with technology. Some are truly individual; others are global; most are in-between. A good place to start is in the household to see how personal habits are connected with the rest of the world. As Dubos (1980) put it, "Think Globally and Act Locally." As consumers of technology, the trade-offs must be as real as the benefits.

Educators must provide a framework that allows individuals to define their role in a technological society that is consistent with the maintenance of a viable human population on a global scale. An important first step is to provide an awareness of the interdependence among individuals, between people and technology, and between the human population and the global environment. The second step must enable individuals to investigate the benefits and trade-offs of both individual and collective interactions with technology. A third step must provide incentives that encourage responsible decisions and behaviors that reflect individual concern for the long-term survival of the human population.

Suggested Readings

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STS AND EE: ARE THEY REALLY DIFFERENT?

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The question, "Science/Technology/Society (STS) and Environmental Education (EE): Are They Really Different?" has received a good deal of attention during the past several years. Most recently, Disinger and Wilson (1986) addressed this question eloquently in their thoughtful paper, Locating the "E" in S/T.S. Among their conclusions, Disinger and Wilson noted that:

> "In a practical sense, it is clear that S/T/S education, however defined and delimited, subsumes to a significant extent the content which environmental education was initiated to purvey, and in fact, if only for purposes of clarity, the inclusion of the term 'environment' in the title of the S/T/S thrust makes sense."

The argument to include an "E" for "environment" in STS education, "S/T/SE" or "S/E/T/S", for example, was also advanced in an earlier paper by Disinger (1986) and in a paper by Lubbers (1986).

Thus, it seems that there is reasonable support from leaders in the EE community for the position that STS and EE are essentially the same. What evidence is there to support this position?

The "Mission Statement" of the North American Association for Environmental Education (NAEE) includes a series of "Guiding Principles" for environmental education. According to the NAEE "Environmental education should:

* consider the environment in its totality - natural and built; biological and physical phenomena and their interrelations with social, economic, political, technological, cultural, historical, moral, and aesthetic aspects;

* integrate knowledge from the disciplines across the natural sciences, social sciences, and humanities;

* examine the scope and complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills and the ability to synthesize data from many fields;

* develop awareness and understanding of global problems, issues, and interdependence, helping people to think globally and act locally;

* consider both short and long term futures on matters of local, national, regional and international importance;

* relate environmental knowledge, problem-solving, values and sensitivity at every level;

* emphasize the role of values, morality, and ethics in shaping attitudes and actions affecting the environment;

* stress the need for active citizen participation in solving environmental problems and preventing new ones;

* enable learners to play a role in planning their learning experiences and providing an opportunity for making decisions and accepting their consequences; and

* be a lifelong process which should begin at a preschool level, continue throughout formal elementary, secondary, and post-secondary levels, and utilize non-formal modes for all age and educational levels."

Even a very casual review of these "principles" reveals an obvious relevance to the topics typically included in STS education programs.

In a recent study, Rodger Bybee (1987), a national leader in the field of STS education, asked science educators from 21 countries to identify and to rank order what they considered to be the top 12 science-technology related global problems. Bybee's study revealed the following:

TWELVE SCIENCE TECHNOLOGY RELATED GLOBAL PROBLEMS AS RANKED BY 262 SCIENCE EDUCATORS FROM 21 COUNTRIES

1. Population Growth
2. War Technology
3. World Hunger
4. Air Quality
5. Water Resources
6. Land Use
7. Energy
8. Hazardous Wastes
9. Human Health
10. Extinction of Plants and Animals
11. Mineral Resources
12. Nuclear Reactors

I would argue that each of these "science-technology" related global issues is, in fact, appropriate content for environmental education as well.

From what I have presented thus far, one could easily be mislead into thinking that STS and EE are, in fact, the same. The fallacy in that line of thought becomes abundantly clear when one considers that, for example, included among the integral topics and issues in STS education (New York Department of Education, 1987) (SSTS Reporter, 1987) are:

Robotics

Artificial Intelligence

Biomedical Technology

To my knowledge, no EE programs or courses deals with any of these issues.

Environmental Education, on the other hand, frequently deals with:

Nature Study

Outdoor Education

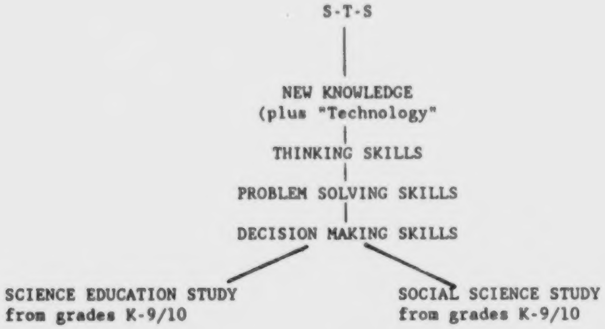
Recreation

I know of no program taught anywhere that includes any of these areas as part of the STS curriculum.

There is another dimension to this STS/EE question that needs to be explored: the fact that there are many "varieties" of Environmental Education programs currently in use in the United States and, indeed, throughout the world. In some programs called EE, outdoor education or conservation education activities dominate. In other programs, nature study, or ecology, or some version of science education comprises most of the EE curriculum. Yet, the content of still other programs looks very much like Bybee's list of "Science-Technology Related Global Problems". Is it possible that they are ALL environmental education programs? According to most commonly accepted contemporary definitions of EE, the answer is unquestionably, YES!

The issue of "variation" in the content or focus of different programs is not restricted to EE, however. In examining STS programs, one also finds significant differences among approaches to be quite common. Some STS programs, for example, focus on teaching SCIENCE THROUGH STS. The S-STS program at the Pennsylvania State University and the Biological Sciences Curriculum Study (BSCS) group at Colorado College take this approach to STS education. Others view STS largely as a way to incorporate advances in TECHNOLOGY into the curricula of the schools. The video course, "You, Me, and Technology" located at Colorado State University (Denver) approaches STS in this manner.

SCIENCE-TECHNOLOGY-SOCIETY: PREPARING FOR TOMORROW'S WORLD (Iozzi, et al., 1984) a twelve volume series for grades 7-12, and DECISIONS FOR TODAY AND TOMORROW: ISSUES IN SCIENCE-TECHNOLOGY-SOCIETY (Iozzi and Bastardo, 1987) do not FOCUS on science nor technology nor society alone. Instead, the authors of these programs APPLY the students' existing knowledge of science and social science concepts from previous study to new contexts - STS topics and issues. These programs focus on developing thinking skills, problem-solving skills, and decision-making skills in an STS context. "New" knowledge is presented when and where it is necessary. The following diagram illustrates this approach:



These programs (Iozzi, et al.) attempt to take a more "balanced" approach to STS education. Instead of focusing on teaching science, or social science, or technology - as do many other programs and projects described above, these authors take a more balanced, interdisciplinary approach to STS education and do not favor any specific discipline.

What then, does this all mean? Are, as the title of this paper asks, STS and EE different? Perhaps the best way for me to respond is with another question: Does it REALLY matter? Does it REALLY matter if these two areas of inquiry are the same? Does it REALLY matter if they are different? From my discussion throughout this paper, it should be clear that, depending on the specific program, STS and EE can be both the same and different. Surely, most topics fall within the domains of both areas; STS and EE. Surely a few topics in EACH area seem to be sufficiently different to fall within the domain of one area or the other. However, I don't believe there is any danger in "overlapping" of content. Nor, for that matter, do I see any danger in certain topics being "restricted" to either STS or to EE courses. I do, however, believe that there is a good deal of danger in dwelling on trying to define differences and arguing who--the science teacher or the social science teacher--should teach STS or EE. The history of EE can provide some meaningful guidance in this regard. For years, environmental educators argued the question: "what is environmental education?" Many papers focused on trying to define the differences among the great variety of EE programs then in existence to try to determine which of the many and varied EE programs REALLY complied with one of several definitions of what EE was all about. Many years were wasted on what I believe was probably a relatively insignificant academic argument. Finally, when ALL the environmental educators stopped focusing on DIFFERENCES and shifted their efforts to looking at what ALL approaches had in COMMON, then the EE field began to flourish.

I believe it would be more productive to look at our commonalities and ignore any differences. I believe that if those who view themselves as environmental educators and those who prefer to be called STS educators pooled their resources and talents and cooperated with each other, great things could be accomplished. We can begin now by working on a problem that is common to both EE and STS. Both EE and STS take, to varying degrees, an INTERDISCIPLINARY approach to education. With our very common "compartmentalized" system of American education, both EE and STS typically encounter a "fit" problem. That is, in which department does STS "rightfully" belong: the science department, or the social studies department, or the new technology education department? Similarly, which department should teach the EE courses? Problems such as these are our "common enemies" because they make it very difficult for school administrators and curriculum coordinators to add our programs to the already overcrowded curricula of our educational institutions.

There are more than enough problems confronting society and, therefore, a tremendous need for the talents and services of BOTH environmental educators AND science-technology-society educators. Let's not dwell on trying to define differences and wasting time trying to "stake out our own territory". Instead, let's focus on our commonalities and on our strengths; let's work together--cooperatively--to help to build a better world for both present and future generations.

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DOVETAILING: ENVIRONMENTAL EDUCATION AND STS

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Environmental Education was probably the major pioneering effort at introducing subject matter derived from a societal problem (not concerned with vocation) into the curriculum of K-12 education. STS is the second, and even more encompassing societal concern based subject matter which is now knocking at the door of all education. Obviously the STS effort can learn an enormous amount from the environmental educators, and NASTS from NAEE.

On the other side, STS covers a very wide range of topics: from economic competitiveness, and technology policy, to science and religious and engineering ethics, which stand alongside environmental issues in the big picture of how society is affected by S/T.

Joining forces could enable a more radical re-orientation away from the discipline orientation of schooling. Issues such as how to educate the school boards and principals away from equating SAT and college entrance orientation with disciplinary courses, and how to educate the Educational Testing Service and colleges and also how to control both NAEE and NASTS.

Organizationally, one could explore a joint meeting of NASTS and NAEE; a joint sponsorship of smaller meetings and workshops, and joint political action.

SCIENCE-TECHNOLOGY-SOCIETY EDUCATION AND ENVIRONMENTAL EDUCATION: COMMON GOALS, COMMON CHALLENGES

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Numerous similarities can be drawn between environmental education (EE) and science-technology-society (STS) education. Consider, for example, Roy and Waks' (1985) description of the emerging STS "principles": "the principles of 'holism' and 'systems', the 'trade-offs' or 'no free lunch' principle, and the principle of inevitable unanticipated side effects." These precepts are critical in their application to social issues in both EE and STS. In a similar view, the content areas of STS education (e.g., energy, population, environmental quality, utilization of natural resources, etc.) are among those often addressed in EE. Similarly, when the goals of EE and STS education are compared, a common thread of citizenship preparation emerges. Consider the following statements:

> [Environmental education should]...aid citizens in becoming environmentally knowledgeable and...skilled and dedicated citizens who are willing to work...toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment. (Harvey, 1978)
>
> Science education should prepare individuals to utilize science for improving their own lives and for coping with an increasingly technological world...and...should produce informed citizens prepared to deal responsibly with science-related societal issues. (Harms & Yager, 1981)

Broad goal statements such as the above are appropriate for conceptualizing the aims of educational endeavors. However, in order to prove manageable in an instructional or curricular sense, they must be translated into more specific goal statements which might then guide educators. How do the goals of EE compare with those of STS education?

The most widely accepted EE goals appear to be those developed by Hungerford, Peyton, & Wilke (1980). These goals were validated against the Tbilisi objectives by a panel of leading U.S. environmental educators, and have been further validated by their use in extensive curriculum development and EE research both in the U.S. and abroad.

Recognizing the consistencies between EE and STS, Ramsey & Hungerford (1987) permutated those EE goals into the STS dimension. Similarly, STS goals have also been developed by Rubba & Wiesenmeyer (1987), who likewise based their STS goals on the earlier EE goals. Although limited space does not permit a full description of the original EE goals and the Rubba & Wiesenmeyer

STS goals, a comparison of the main goal levels in each reveals the strong connections between EE and STS education.

A COMPARISON OF THE EE AND STS EDUCATION GOAL LEVELS

EE Goals (Hungerford, Peyton & Wilke, 1980)	STS Education Goals (Rubba & Wiesenmeyer, 1987)
Level I: Ecological Foundations... seeks to provide the receiver with sufficient ecological foundations knowledge to permit him/her to eventually make ecologically sound decisions with respect to environmental issues.	Level I: STS Foundations... would provide learners with sufficient background knowledge, a) of concepts in the natural sciences and social sciences, b) on the nature of science and technology, and c) in the characteristic interactions among science, technology, and society, to enable them to make informed decisions on STS issues.
Level II: Conceptual Awareness--Issues and Values...seeks to guide the development of a conceptual awareness of how individual and collective actions may influence the relationship between quality of life and the quality of environment, and also how these actions result in environmental issues which must be resolved through investigation, evaluation, values clarification, decision-making, and finally, citizenship action.	Level II: STS Awareness... learners would become cognizant of how the interrelationships between science, technology, and society sometimes result in issues which must be resolved by examining: a) all sides of the issue, b) associated human beliefs and values, c) alternative solutions for resolving the issues, and then by d) taking action.
Level III: Investigation and Evaluation...provides for the development of (and provides opportunities for the application of) the knowledge and skills necessary to permit receivers to investigate environmental issues and evaluate alternative solutions for remediating these issues. Similarly, values are clarified with respect to these issues and alternative solutions.	Level III: STS Investigation... develops in learners the knowledge and skills to enable them to investigate STS issues and to judge the efficacy of possible solutions against various value positions. STS education directed at Level III would have two components...training with problem investigation skills...(and)...opportunity for learners to apply these skills.
Level IV: Environmental Action Skills - Training and Application...seeks to guide the development of (and provides	Level IV: STS Action Skill Development...seeks to develop in learners skills which they could use, working individually or in

opportunities for the application of) the knowledge and skills necessary for receivers to take positive environmental action for the purpose of achieving and/or maintaining a dynamic equilibrium between the quality of life and the quality of the environment.

groups, to take action on STS issues. This again would include instructional activities designed to develop an understanding of actions...and also, opportunities to take actions.

When one examines the goals of EE and of STS education, obvious similarities emerge. Both focus on citizen preparation, and both include a hierarchical goal structure which encompasses foundational knowledge and issue awareness and which includes both issue investigation/evaluation and citizenship participation skills.

As to the exact nature of the relationship between EE and STS education, it may properly be argued that STS education encompasses EE. Indeed, both enterprises are issue-focused, and all environmental issues probably fall within the realm of STS issues. Conversely, STS issues include many which are not strictly "environmental" in nature (e.g., computer ethics, robotics in the workplace, "star wars" weaponry, etc.).

Be that as it may, establishing the exact nature of the EE-STS education relationship may not be critical. It *is* critical, however, that educators in both fields recognize (and actualize) the need to comprehensively address all four goal levels (foundation knowledge, issue awareness, issue investigation skills, and citizenship action skills) as they attend to citizenship preparation.

Research into responsible citizenship behavior strongly suggests that we cannot move learners into active and responsible participation as citizens unless we teach beyond the knowledge and awareness levels (Klingler, 1980; Ramsey, Hungerford, & Tomera, 1981). It appears that two potent characteristics, "ownership" and "empowerment" are acquired through active engagement in issue investigation/evaluation and citizenship action (training and application).

In light of the critical environmental and (other) science-related-social issues which we face, it seems foolhardy to aim for less than full and responsible involvement on the part of learners and/or citizens. That monumental task should probably shape future collaboration between environmental educators and science-technology-society educators in K-12 education, curriculum development, and teacher training.

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S/T/S/E AND NETWORKING

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An emerging focus of pre-college education in the 1980s is the interaction of science and technology in terms of their combined interrelationships with society. The characterizations of the science/technology/society (S/T/S/) theme, as advanced by science educators, social studies educators, and environmental educators, exhibit similarities.

One purpose of this presentation is to highlight the interconnections of the S/T/S perspectives of the three fields and, in particular, to note contributions that environmental education might make to the implementation of the various S/T/S goals of general education.

This will involve the description of the S/T/S involvements of all three thrusts and comparisons of the work of individuals and of organizations working toward similar S/T/S goals that include and emphasize environmental education components (i.e., S/T/S/E). Goal statements relating to the S/T/S thrusts from all three fields will be presented.

During the spring of 1988 a pilot study was conducted by this presentor to assess the perceived goals of environmental education of professional environmental educators who work in a regional network of thirteen university-based centers for environmental education. The results of this study also will be presented, particularly in light of their relationship to S/T/S/E approaches.

In addition, the benefits of such networks will be addressed. With the emergence of the National Network for Environmental Education, the framework of the aforementioned regional network will be discussed. Since such networks tend to offer cooperative approaches to programming, they can broaden support and expand programmatic scope at a time when many university environmental education programs have disappeared.

SCIENCE/SOCIETY/TECHNOLOGY/ENVIRONMENT EDUCATION; A SUMMARY OF A SURVEY

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During 1986, the ERIC Clearinghouse for Science, Mathematics, and Environmental Education conducted a survey to determine the extent of implementation of Science/Society/Technology/Environment Education nationwide, by soliciting input from representatives of the state education agencies. An assumption was made that, in practice, "environmental education" is closely aligned with the more recent curricular thrust for Science/Technology/Society education. The full report of the survey (Disinger, 1986) includes a substantive literature review in support of this assumption.

Questionnaires were mailed to at least one professional staff person in each of the 50 state education agencies, and to representatives of appropriate agencies in three districts and territories of the United States. They were addressed to members of the Council of State Science Supervisors (CS-3) and to individuals listed as environmental education coordinators. In 31 states, the same name appeared on both lists; while in 22, different names appeared on the two lists. Individual respondents totalled 48, representing 41 agencies (40 states plus the District of Columbia).

Of the 41 agency responses, two left blank the space for describing the policy of the agency with respect to S/S/T/E education, while 12 indicted that their agencies had no policies in this regard. One additional response specified that the agency referenced maintains a "local control" policy, suggesting that there are no state-wide thrusts in any curricular area. Thus, 15 of the responses may be interpreted to indicate that those agencies have no operational policy with respect to S/S/T/E or related areas.

Twenty-nine of the 41 responses specifically mentioned S/T/S or S/S/T/E somewhere in their responses. This suggests that most state education agencies have initiated at least some S/T/S-directed activity, whether or not "environment" is specifically included.

Also in response to the query regarding policy, nine responses indicated that environmental education is administered separately from science education, while 17 responses reported that environmental education and/or S/S/T/E education are subsumed by or infused into the total curriculum, frequently as an adjunct of science education.

There appears to be an assumption that infusion of environmental education into the curriculum, particularly into science education, in effect produces S/S/T/E education. Three of the 17 "infusion responses" specifically stated that S/S/T/E is "implicitly" part of the agency's science education and/or general education effort. Similar terms appearing in responses included forms of these words: "integrate" (six cases), "incorporate" (4 cases), "include" (2 cases), "infuse" (1 case), and "covert" (1 case).

Of the 41 agency responses, eight indicated no agency involvement in the development of curriculum materials related to S/S/T/E. Model guides were noted by eight other respondents, while state standards dealing with this topic were mentioned by four more. Published guides and similar resources were noted by 17, while nine indicted their support of local efforts in this area. Of those materials listed by respondents, nearly all are in related areas, and do not carry titles or descriptions specifically targeted on or commonly identified as S/S/T/E or S/T/S. The sole exception to this generalization is New York State's Middle/Junior High School Syllabus, Block J: Science, Technology, and Society.

An analysis of survey responses indicates that in no case is S/S/T/E education identified as a formalized activity of a responding agency, though many indicate at lease some attention to it. The former is not surprising; at no level within the educational community has a potential coupling of S/T/S and environmental education been verbalized, with the exceptions of occasional academic papers.

However, responses to this survey indicated that such a coupling has been and is being accomplished operationally, at least at the state education agency level. Three respondents used the word "implicit" to describe their functional understanding and regularized treatment of S/S/T/E, while others used other terms to describe the inclusion of environmental topics in a science curriculum. The citation of many on-going activities serve to support this contention. Similar logic, when applied to the responses reported in this study, leads to strong inference that similar situations pertain at local levels. Thus, it appears that a union of an expanded S/T/S thrust with a redirection of environmental education, or perhaps a revitalization of environmental education through capitalization of its centrality to S/T/S concerns, is now occurring.

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Final Note

A special thanks is in order to Clint Shepard for his patience and cooperation in helping us to make this symposium a success. Now it is up to us to maintain the momentum and explore the opportunities to do what needs to be done. If you (that means YOU!) have any suggestions or would like to get involved, please contact the symposium participant nearest you! Thanks to all for contributing your time and efforts--let's keep in touch!

EDUCATION FOR THE NEXT GENERATION OF PROBLEMS TO FACE THE ENVIRONMENTAL PROFESSIONAL

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Introduction

The position taken by Dr. Petulla is one of advocacy: he argues that for environmental education to be useful--that is, to lead to positions of importance, likely to influence future environmental quality--students need a stronger science base and an appropriate background drawn from applications. From his extensive past study of how the working tools of environmental management are put to use, Dr. Petulla deduces specific needs as:

(1) more scientific study,

(2) within a solid general education,

(3) including an introduction to the emerging environmental professional culture, and,

(4) as a capstone element, experience with the practical application of the lessons learned.

I heartily endorse these views.

As Dr. Petulla indicates, much of the work of environmental problem-solving comes down to bridging activities between established disciplines; tying together into a coherent whole contributions by "experts" (who characteristically study a portion of a tree, not the forest ecosystem). I would extend his characterization of the "Technical Negotiator" to incorporate just a bit more needed background:

(1) knowledge of production processes,

(2) engineering--mass and energy balance, plus an introduction to rate processes and applied mathematics,

(3) science--chemistry and biology, plus an introduction to earth and atmospheric sciences,

(4) law and economics, and

(5) ability to work with others.

It is an easy matter to sketch the basic thrust of a curriculum in a few short sentences. It is another matter to actually develop workable programs which incorporate the indicated large share out of our total knowledge base, and yet can be taught within a reasonable period of years. Thus we must expect to justify our request for the extra effort and time involved. I propose to do this using two examples. One looks at a long-standing environmental issue which just in recent months has become front-page news; the second looks at a problem area that has become well-established over recent years, and appears ready to continue almost indefinitely. For the second I will sketch a specific educational approach designed to prepare individuals to work effectively in the area.

Atmospheric Gases and Potential for Climate Change

Future climates may be much different than what we experience today. There is a linkage between minor constituents of the atmosphere and climate, with carbon dioxide of particular and widely recognized concern. But other trace gases are becoming more and more recognized as potential contributors as well: nitrous oxide, methane, the chlorofluorocarbons. Their atmospheric concentration, or "mixing ratio," has been gradually increasing along with population growth and industrialization. Because these gases absorb infrared radiation and prevent heat rejection to space, heating of the troposphere is an expected result. Our resent study for the Electric Power Research Institute with Dr. Derek Montague, University of Wyoming, reviewed (and to a limited degree extended) the data of hundreds of prior researchers. We took the gamble of projecting potential changes over the next 100 years, assuming implementation of the Montreal Protocol and use of tentatively selected substitute materials for critical CFC applications, with the results given in Table 1.

The data presented indicate rather clearly that, despite a scenario which assumes serious efforts to reduce impacts, global heating could prove a gigantic environmental problem in the foreseeable future. Further, while carbon dioxide is the principal culprit, other gases make a surprisingly large contribution. CFCs are seen in these results as of substantially less importance, but not eliminated, because of the Montreal Protocol and other likely regulatory decisions. But gases such as methane and nitrous oxide, derived from both natural and industrial sources, may also need to be "managed" to solve the problem. Let us take a look at methane as one example of what maturing environmental professionals will need to work with and understand.

Methane and Global Heating

The Sources. Environmentally concerned individuals generally consider methane as one of the "good" chemical compounds. As a fuel it is preferred because it burns relatively cleanly, is cheap and convenient to use, and is generally not considered a photochemically reactive contributor to the smog problem. But on a global basis the sources of concern are not waste methane lost from man-made systems. Increasing atmospheric methane is primarily the result of production through biogenic processes taking place in wetlands, rice paddies, forests, and within herbivorous animals and insects (including cattle and termites). Biomass burning and other anthropogenic processes contribute a good share, but probably less than 20% of the total. Wetlands are a very large source; important because they are critical to many ecosystems, and production of good for man's use as well. Some animal sources, such as termites, were only recognized as such quite recently. Much of the marine system appears supersaturated and may be a significant source, though little is really known. As less developed countries attempt to improve their economies, and sometimes in order just to survive, biomass burning occurs with methane release as a byproduct. Thus there is a basis for concern over growth.

Atmospheric Presence. Methane was first measured in the atmosphere in 1862. Subsequent measurements, thorough with controlled, reliable results only recently, suggest a steady growth (about 1% per year) along with population growth and industrialization. It is well mixed vertically in the troposphere, decreasing into the stratosphere. Enough is present so that it can play an important role in atmospheric chemistry. The principal removal mechanism is reaction with the hydroxyl radical:

$$OH + CH_4 \rightarrow H_2O + CH_3$$

Table 1
Potential Atmospheric Changes: Year 2090

Atmospheric Gas	Post-1988 Change in Mixing Ratio: Basic (Alternate) Scenario)	Increment for Greenhouse Forcing, °K per ppbv	Potential for Temperature Change °K: Basic (Alt. Scenario)
Carbon Dioxide	+ 294 (+ 43) ppmv	0.000006	1.76 (0.26)
Ozone	+ 0 (± 0.097) fraction	0.02	0.0 (± 0.08)
Methane	+ 1.724 (+ 2.973) ppmv	0.00019	0.33 (0.56)
Nitrous Oxide	+ 126 (+ 89) ppbv	0.0016	0.20 (0.14)
Carbon Tetra Chloride	+ 697 (+ 498) pptv	0.08	0.055 (0.040)
CFC-11	+ 141 pptv	0.14	0.020
CFC-12	+ 470 pptv	0.16	0.075
CFC 13	+ 40 pptv	0.22	0.009
CFC 14	+ 300 pptv	0.06	0.018
CFC-22	+ 3130 pptv	0.05	0.16
CFC-113	+ 134 pptv	0.1*	0.013
CFC-114	+ 20 pptv	0.13*	0.003
CFC-115	+ 10 pptv	0.13*	0.001
CFC-116	+ 50 pptv	0.13	0.007
CFC-140a	+406 pptv	0.02	0.008

Halon 1211	+ 1 pptv	0.12*	0.0001
Halon 1301	+ 7 pptv	0.16	0.001
CFC-123 (subst.)	+ 628 pptv	0.15*	0.094
CFC-134a(subst.)	+ 1510 pptv	0.04	0.060

(*estimated value) CUMULATIVE POTENTIAL FOR CHANGE: + 2.3 °K

The product methyl radical then degrades by reaction with oxygen and reactive participation with nitric oxide to yield the hydroperoxy radical (HO) and formaldehyde (HCHO). These, in turn, can each act as a precursor to the hydroxyl radical, thus embodying a feedback regenerative loop. A consequence is that methane plays a major role in the atmospheric concentration of hydroxyl radicals, and through them indirectly influences the lifetimes of other atmospheric trace species as these involve the same partner. Estimates of the atmospheric lifetime of methane range from a few months up to twenty or so years; our conclusion is that a value in the neighborhood of about eight to ten years is preferred.

Atmospheric Heating. Methane has a strong, fine-structured absorption band in the infrared centered at 7.65 micrometers. On a per-molecule basis, methane is about 20 times more effective for terrestrial radiation absorption than carbon dioxide. More precise evaluation of potential impacts requires a model including climate feedback effects resulting from changes in relative humidity, cloud altitude and temperature, and albedo. We can say with certainty that, while its potential has only recently been realized, changes in the methane mixing ratio will have far reaching effects (see Table 1). The atmospheric system is highly interconnected and contains radiative, climatic and chemical feedback.

Importance to Environmental Education

I believe that the example given--which could readily be extended to include many more example compounds (nitrous oxide, the long list of CFCs, carbon dioxide itself) and the involvement of even more natural and man-made systems--illustrates just how much interconnectedness there will be in the problems our students are called on to resolve in the future. It also shows how one cannot escape from the need for a stronger science base even if one does not plan to be the focused specialist, but seeks to integrate scientific knowledge into problem resolution. We should not be preparing students to be either a technically-oriented but low level "grunt" or a more socially-oriented "go-for." We should strive for a level of preparation suited to work as a professional. For that there never will be a "too-strong" level of science- and technically-based preparation. At the same time, because in a free society people must willingly accept regulations and other restrictions on their freedom of action, it is equally essential that our educational programs incorporate the human side of the equation; who benefits, who pays, what risks are "acceptable," and how fair do our recommendations appear to the public.

Design of a Hazardous Waste Remediation Program

Problems with hazardous waste management have surfaced at a tremendous pace over the last decade. Perhaps serious effort put forth now will reduce the frequency of future problem generation, but our present legacy promises to keep environmentally qualified individuals employed for several decades into the future, at the very least. How to address such problems is a required element in the educational preparation of environmental engineering professionals, and related disciplines working with them. The place where we provide this preparation is in a senior-year, undergraduate course (though many graduate students also participate). The mechanism involves replacing the customary weekly (or thereabouts) assignment of a good number of modest homework problems with participation in a single, term-long project. Of necessity, the effort involves teams of students, selected to blend differences in preparation and goals/interests so as to maximize the opportunity for the team to meet problem statement requirements. The first page of the problem statement as given to the class during the Spring term of 1988 is reproduced below.

DESIGN PROBLEM, SPRING, 1988

The package enclosed includes reference material and background for an exercise in the design of remediation alternatives to solve a serious, continuing waste management problem. In summary, the reference material includes:

(1) Background material on the area and activities.
(2) Data on initial compliance monitoring following discovery that there was a problem, together with waste material and water quality characterization.
(3) Hydrogeological background data.
(4) Description of efforts in several stages to remedy the problem at the waste site, including:
  - Phase I - An initial proposal by "KKK, Inc.," consultants to "Dispos-All, Ltd.," as to an "effective, cost-effective" approach to management of wastes produced at the "Rich-Kwik" facility.
  - Phase II -Issuance of an Executive Order by the state Department of Environmental Quality requiring specific cleanup actions.
  - Phase III - A hydrologic update and a revised action proposal by "KKK, Inc." and "Dispos-All."
  - Phase IV - Eventual discovery using detailed groundwater chemical data that risks from leachate and its movement entail greater risk than first thought; parallel discovery that a proposed location for off-site remediation of contaminated materials itself may include solvent contamination.

You are asked, in part individually and in part together with other members of your project design team, to do the following:

(1) Provide a critical evaluation of "Executive Order 666-1980" enclosed with the reference material.
(2) Provide a critical technical evaluation of the steps proposed, and taken, by "Dispos-All, Ltd." and its team on behalf of "Rick-Kwik" and themselves to clean up the site and protect health and the environment.
(3) Working as a consultant team, using all of the data provided, prepare a response to the recent "Request for Proposal" issued by state agencies as they find it necessary to take over guidance of the remediation effort following continued lack of performance by "Rich-Kwik" and "Dispos-All, Ltd.," and their pending bankruptcy. In carrying out this effort your team will evaluate several alternatives for the LaBounty site, and for the parallel preparation and possible utilization of an off-site location selected for possible remediation and permanent storage of disposed materials. The results are to be presented as a conceptual design for resolution of the waste problem.

The data are obtained from state and federal agency files for an actual problem site (the LaBounty site, near Charles City, Iowa), thus providing a factual base and history from which to work, including the usual omissions and errors characteristic of real problems. It is essential to include in each team some background in the earth sciences, chemistry, hydrology and environmental health; and, of course, engineering. Each team functions as one of a "short list" of potential contractors judged qualified to conduct the design, and eventually, the remediation effort. Members are provided with guided access to library resources as well as the data files, maps, etc., included within the 50 page problem statement. They also have access to several of the simpler mathematical models which could prove useful, and computer time. For the resulting plan to be accepted it must meet more than high standards for technical feasibility and cost effectiveness; the remediation design must also be acceptable to neighboring residents and others of the potentially impacted community. An added requirement is to include general recommendations for future waste management at facilities of this kind. Naturally, there is an absolute deadline for submission of the team's work product.

Of course, there are also conventional lectures and discussion, plus reading of general reference material, and other assignments more characteristic of the usual classroom instruction.

Students grade this class as a very stimulating experience; worthwhile, opening their eyes as to how to use the knowledge they have obtained from prior classes, etc. It is a new experience to learn to do significant work as a member of a team. They do not grade the instructor who challenges them this way as kindly as they grade the class. Experience with this kind of teaching over a number od years suggests to me that, while more difficult to organize and present than some other kinds of instruction, it provides substantially better preparation for future accomplishment. Thus it meets our goals.

SYMPOSIUM II

ENVIRONMENTAL STUDIES AND GENERAL EDUCATION

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Redesigning the university curriculum at the undergraduate level is an object of widespread interest across the nation (Boyer, 1987). On the surface, it appears to have sprung full-grown, as if from the head of Zeus, in such a manner that all parties involved in undergraduate education, or interested in it at any level, are perforce both obligated and eager to express opinions, formulate responses, initiate new courses and curricula, and on occasion defend turf.

A bit of reflection reminds us that this is, after all, a reiteration of earlier calls for liberalizing the undergraduate university curriculum similar to that advanced by Conant in 1945; the pendulum swings again.

For one example, the Special Committee for Undergraduate Curriculum Review in Arts and Sciences at The Ohio State University has developed this position statement:

> "To achieve the aims of education, there are certain capacities and understandings, certain qualities, abilities, and characteristics, which are part of what we understand as the liberating process a university is particularly suited to develop, nourish, and hone. Primary among these capacities is the ability to write and speak with clarity and precision; to read and listen critically and with comprehension. Of the same order is the ability to engage in careful logical thinking and critical analysis, including the abilities that permit intelligent responses to problems and arguments which involve quantitative data.
>
> An understanding of and appreciation for the most important modes of human thought and inquiry are crucial characteristics of a liberal education. An understanding of the methods of modern science and social science, the effect of science and technology on the natural and social environment, and the nature of mathematical knowledge constitutes part of this knowledge. The development of a refined historical, artistic, and literary consciousness is a further part. A liberal education should also develop and sharpen the capacity and confidence to make informed and discriminating ethical and aesthetic judgments.
>
> We believe that a liberal education in a university in our own nation today should foster an understanding of

> American institutions and the pluralistic nature of American society. It should also promote an understanding of the global interdependence of the modern world and should ensure facility with at least one language other than English. Finally, we think that an American university should seek to develop a deep appreciation for the cultural traditions that have formed and informed our nation and to develop a sense of the place of other cultures in world history."

As in most universities, faculty in the academic units at Ohio State are torn between their recognition of the need for a general liberal education for undergraduate students and the particular demands of their own majors--in a word, how can they include both the general education expectations of a liberalized curriculum with the more specific needs of their students, in their major areas of concentration? Particularly, how can this be accommodated within a four-year undergraduate program? In today's symposium, we are addressing this concern. Of course, we are approaching it by presenting one session on general education aspects, and another on concerns relating to careers. Thus, we are open to the criticism we are least implicitly direct at others--separation of an intricately interrelated "system" into somewhat arbitrary halves. But then, we will use the same argument that others use--one must start somewhere.

Figure 1, the "Conspectus of the Model", summarizes the pigeon holes into which the operational elements of the proposed solution to the problem of a liberal education--the curricular entities--are to be placed, within the Ohio State model. A logical strategy is to attempt to locate spaces--openings, courses, requirements, whatever--in the proposed "new" curriculum model where at least some of that which we already hold to be of particular, professional significance to majors in specific fields will "fit." The other side to this argument is that we also believe that all students, including those not pursuing career goals related to the environment, also need the opportunity--whether they know it or not--to learn about the environment, if only because they live in it. This "fitting" exercise may be too practical to appeal to purists, but it is operational; it is what people do, and can be justified readily by those whose task it is to make a curriculum work.

It turns out that the Ohio State general education model is replete with opportunities for the inclusion of environmental concerns; that is, there are many entry points through which environmental studies may readily be introduced as a significant component of a general education curriculum. A few are noted in the paragraphs below.

> "...skills in expository writing as well as in oral discussion and/or presentation will be developed through the study of major topics and writings pertaining to the United States (e.g.,...the impact of technology on contemporary culture...)"

> "Students should be able to discriminate between the truth and fiction inherent in quantitative presentations used for planning, budgeting, or other

Figure 1: CONSPECTUS OF THE (OHIO STATE) MODEL

FOUNDATIONS	Credits*	
	B.A.	B.S.
1. Writing and Related Skills		
Three courses: first course	5	5
second course	5	5
third course	(within major)	
2. Quantitative and logical skills		
Placement for basic computational skills	0	0
Mathematical and Logical Skills	5	10
Data Analysis	0-5	in major
3. Foreign Language Two to four courses	10-20	10-20
4. Social Diversity	0	0
NATURAL SCIENCE		
Four or five courses, including sequence	20-25	25
SOCIAL SCIENCE		
Three courses, including sequence	15	15
ARTS AND HUMANITIES		
Two courses: chronological overview	10	10
Three courses: structured selection	15	15
CAPSTONE EXPERIENCES		
1. Advanced study in Social Science or Arts and Humanities	5	not req.
2. Issues of the Contemporary World	5	5
Total GER Hours	95-115	100-110

*In quarter hours of credit

matters affecting the general public, as well as in academic studies. They should have a command of mathematical concepts and methods adequate to understand arguments based on statistical, graphical, or measurement data, as well as surveys and polls..."

"Developments in the natural sciences and in technology over the past century have produced profound changes in knowledge and understanding of the material universe, in means of communication, in social and commercial organization, in philosophy--indeed in almost every aspect of life--on a global scale. While it is possible to exist without knowledge or understanding of modern science and technology, it is dangerous to do so and is hardly the hallmark of an educated person. The University has a responsibility to provide students with insights and understanding about the natural sciences and technology and their relations to life and society. Natural science should be presented not as a collection of isolated facts but as a highly unified and consistent view of the physical world..."

"Social science consists of the systematic study of the behavior of individuals; of the structure of human societies, cultures, and institutions; and of the processes by which individuals, groups, and societies allocate and use resources..."

"Humanistic inquiry assesses, across temporal, cultural, or theoretical divisions, how humans view themselves in relation to other humans, to nature, to the divine..."

"...issues addressed (in a capstone course)...must...have worldwide significance and illustrate global interdependence. Topics from which such contemporary issues might be drawn include: energy, urbanization, food production,...governmental regulation, environment, disease and hunger, industrial and technological development, social responsibility,..."

"Each (capstone) course should bring together students from diverse majors, thereby creating an integrated learning environment in which, through interaction, the students themselves demonstrate the relationships or connections between information derived from different departments. The thematic approach of the course should ultimately permit students to appreciate the application of knowledge from diverse disciplines to contemporary issues."

The Ohio State model may be seen as a contemporary response by a major university to a challenge to rethink its general education curriculum. The fact that such models, at Ohio State and elsewhere, are being devised by university-wide faculty committees representing broad ranges of expertise, the gamut of the disciplines, assures their internal respectability and increases the chances that they may actually work.

It is apparent that much of the rhetoric of current movements directed toward reform in undergraduate education is not only compatible with longstanding practice in environmental studies, but uses environmental studies content and methodologies as exemplars. Any number of case studies over the past two decades have provided similar arguments in support of environmental studies as general education, while a few surveys and "think pieces" have drawn similar conclusions (for examples, Schoenfeld and Disinger, 1978; Disinger and Schoenfeld, 1987).

It should, of course, also be noted that current thrusts toward curriculum change at undergraduate levels address subject matter beyond the scope of traditional, more narrowly defined environmental studies--if anything which is so broadly conceived, and is in the main less than twenty years old, can be said to have developed its own traditions and exhibit serious narrowness of scope. Many of these "new emphases" are in the realm of what elementary/secondary educators call"science/technology/society" education. But this is also arguably a variant of environmental studies (for example, see Volk, 1984).

What is very clear is that the methodologies common to the broad-purpose environmental studies programs of the past two decades, and today, are what are now identified as preferred approaches to general education. Whether or not universities have the will to overcome the inertia of the centuries to adopt or adapt the methodologies, particularly the interdisciplinary models, or today's practitioners of environmental studies is at present an unanswered question.

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SYMPOSIUM II

EDUCATION FOR ENVIRONMENTAL SPECIALISTS

Joseph M. Petulla

One should begin any discussion of environmental education by pointing out the obvious: that there are dozens of purposes and learning outcomes for all kinds of environmental education, and just as many for the training of environmental specialists: e.g. natural history experts, natural resource specialists, laboratory technicians, agency personnel, environmental managers in industry, specialists for consulting firms, etc. But young people often enter college environmental studies departments without the faintest knowledge of what kinds of expertise it takes for any of these positions. They simply assume that the environmental studies curriculum will position them for good jobs. I should like to propose a 'right to know' law binding environmental educators to warn environmental studies students that they need a strong science background if they are interested in competing for most positions in the environmental field, even allowing for the differences mentioned above.

Here I want to focus on the people who have been hired in the past generation to deal with legislation for clean water, clean air, hazardous waste, solid waste, contaminated dump sites and the myriad other regulations assigned to offer succor beleaguered urban dwellers.

A few years ago at an NAEE conference in Washington D.C., I calculated that CERCLA, the so-called federal Superfund law, alone will create at least 2 million positions for ten or more years, based on the $10 billion allocation of 1986. But the work of superfund cleanup is only a drop in the environmental cleanup demand-bucket. For example, the EIS industry is still sputtering along, and still requiring thousands of specialists and bureaucrats. The implementation of the Clean Air and the Clean Water laws demand tens of thousands of people in industry, agencies and consulting firms to do the work. New laws covering occupational health and safety and solid and hazardous wastes have been passed by federal, state and local governments in the past decade. Many states require health reviews or risk assessment that focus on the potential impacts of toxic chemicals, handling problems, fugitive emissions and catastrophic events. Permitting for new construction required by all levels of government has become so complicated that specialists need months of lead time to begin the planning process. Many of these demands piled up during the Reagan revolution, mostly because of the dozens of toxic disasters and political pressures from environmental groups.

The background for the assumptions and suggestions of this paper have been derived from a five year study of environmental specialists in industry and agencies finished in 1986. In brief, one of the conclusions of the study pointed to the need for a new look at the way we educate the people who work in the environmental field because of confused professional identities and nonexistent professional standards. I also suggest more scientific study, a solid general education, an introduction to the emerging environmental professional culture and some practical work experience.

The most illuminating aspect of the study was the opportunity to examine precisely what kind of work environmental specialists in industry and agencies actually do. From that baseline I made some inferences about the kind of education they need beyond a basic understanding of environmental issues. Another interesting by-product of the study was information about what disciplines the specialists studied in college. Environmental studies majors rarely appeared in my target group, perhaps because they are suspect of undue environmental fervor, more probably because those who do the hiring are looking for specialists rather than generalists.

Environmental specialists in industry do a great deal of regulatory paperwork, monitoring of plant smokestacks, wastewater sampling, laboratory work, industrial hygiene and safety, community work, and jawboning with senior corporate officers as well as enforcement personnel. In agencies, the work includes permitting, inspections and enforcement units, sometimes with laboratory sections, and a variety of planning tasks. Specialists in consulting firms perform many of the environmental tasks for industry.

Some of this work needs simple technical skills that one might get from a community college chemistry curriculum. In order to do the job mindlessly, either in industry or in agencies--i.e., the paperwork or repetitive monitoring or even laboratory tasks--very little education is needed. Sometimes plant managers would rather promote someone on the production line without a college degree to do environmental work because he (rarely she) has proved his loyalty and will do what he is told. Environmental specialists who are expected always to do what they are told do not need to know very much. But those who are expected to keep their firms out of trouble with enforcement agencies and who want to do "good work" (the term Schumacher used to refer to competent, meaningful work) need to know much more than most college environmental programs I am aware of are providing.

In short, trained professionals need to know the language of environmental management, which is scientific (mostly chemistry which one should know even to gain a basic appreciation of environmental issues), mathematics and fundamental cost analysis or economics; they need to be well educated and to know how to think clearly; they need a great deal of regulatory and technological information that is continually changing; and they have to be committed to the work, which is extremely demanding.

The term I use to describe the work of environmental management is "technical negotiation." The profession assumes a grasp of technical knowledge of production processes, engineering (such as a knowledge of mass balance and energy balance problems), science (especially chemistry and biology), law and economics, and the ability to work with teams of experts. The designation of "technical negotiator" includes much more than the traditional connotations of a person who clarifies issues and brings together conflicting parties. The term goes beyond what has been referred to as environmental mediation, i.e., someone who hammers out agreements among conflicting parties in an environmental dispute. Environmental mediators assume conflicts and attempt to facilitate compromises among adversaries. Mediating competence is important but not nearly enough.

Since environmental problems are extremely complex and in industry and agencies usually handled by management teams of lawyers and middle managers rather than individuals, the environmental professional needs a personal repository of expert knowledge to explain the consequences of the firm's or agency's options. Thus, a technical negotiator must be able to make specific recommendations to both the company management team and to local, state, and federal regulators. The environmental manager's experience and knowledge can help resolve a dispute or work out a corporate policy, but does not replace the contending parties' decisions. The environmental manager does not necessarily resolve conflict, but rather knows enough to recognize technical difficulties and pose solutions. Environmental managers must evaluate the reports of specialists so they can make informed judgments on cost-effective pollution control strategies that also comply with environmental regulations.

Environmental professionals should be able to do technical negotiation. To underscore the educational issue once again, they need a broad background in the liberal arts and sciences, as well as solid engineering skills. The worker in industry should be able to look beyond the immediate goals of production and profit, to long-term goals of the firm that merge the intent of environmental regulation with its own enlightened interest. Agency personnel should be able to overcome political obstacles and bureaucratic myopia or inertia, and move beyond deficiencies and irrationalities in the regulations. Staff members of environmental groups need a more realistic approach and a less strident message, something beyond the "good guys/bad guys" mentality that polarizes people of good will. Environmental specialists in consulting firms will hopefully act as a leaven in the mass of engineers and other technical specialists who often are intellectually bound to the precepts of their own discipline.

The environmental manager in industry will not take on the role as the regulator's alter ego in the plant but does have to see to it that the regulations are met and the company's long-term survival is assured by solid management and planning practices. Environmental specialists in agencies can have their sights lowered by the multiplicity of political angles and bureaucratic infighting that threaten any objective analysis. Environmentalists need to practice looking at the problem from other people's points of view, without giving up their genuine ideals and hopes for a better environment. In reality, there are many points of practical agreement between conflicting parties.

The goal of the environmental professional needs to focus on the work of a technical negotiator, defined by Walter Lippmann in The Public Philosophy (p. 43) as a "rational" person, defined as "one who decides where he will strike a balance between what he desires and what can be done...In the real world there are always equations which have to be adjusted between the possible and the desired." Idealized environmental protection is always qualified by what can be done, what is possible. Such a goal presents a standard worthy of any profession. In general, an antagonistic relationship exists among industry, agencies and environmental interest groups. A student in our graduate program working in an agency recently changed to an industry position. A few of his friends joked, "You used to be one of them. Now you're one of us." Unfortunately, it was a joke with a basis in fact just about everywhere.

An environmental manager who is well prepared can save his firm a great deal of money as well as continued litigation costs, and become a monumental environmental force as well. One of the respondents of my study told me that one big problem he had with agencies was the difficulty in planning huge capital outlays for pollution-control equipment. So he wrote a memo to the plant managers telling them that though the company had special permit for discharges above the standard, there was no way to know whether the government--federal or state--would refuse to renew it. Therefore he set up a 10 year environmental management plan, for which he got plant and agency approval, that provided the company with a longer time-frame to pay for the capital equipment than might have been allowed under sudden political pressures. He also phased out old, ineffective treatment processes. The simple notion of setting up a long-term plan to modernize equipment or to introduce very expensive pollution control equipment is a model that could be used to solve many seemingly intractable problems from acid rain to hazardous waste problems from outmoded production systems. But the environmental specialists who negotiate such environmental plans need the background to be able to understand technical details as well as broad environmental and regulatory issues.

The task of environmental education of this group of people is immense, not only because of the courses or broad education they need, but because the pressures of the work itself are so great. Environmental science or E.S. courses need to introduce this potential workforce into the emerging culture of environmental management. Committed professionals should lead monthly discussions with college students to get them ready for life as it is in the real world. And practical work or internships should be made available to those who are interested in work in the field.

One reviewer of my book Environmental Protection in the U.S. concluded his review with the worlds: "This book is not likely to inspire people to join the environmental profession; it describes too clearly the frustrations and obstacles facing the concerned practitioner. Rather, it provides insight and verification to those actively involved in the environmental management and to those struggling to contribute effectively to environmental protection and remediation. In that regard, it is consoling to read a reminder of the events that have led us into the fix facing us today, letting us know that we are not alone in our struggle." (The Environmental Professional 2:88)

This assessment shocked me because it did not occur to me that the argument of the book, which primarily deals with the need for a strong environmental workforce, might actually discourage people from entering the field. I believe that environmental management can and should be the kind of "good work" that E.F. Schumacher described--a life's work that is rewarding because it serves the earth as it serves other people. But the dozens of reviews and letters I have received from environmental specialists around the country also indicate that the book accurately presented the difficulties of the field. The least we can do for our students is prepare them for these potential sources of stress. And then provide them with such a strong education and introduction to the culture of environmental management that these difficulties do not materialize in their professional life.

SYMPOSIUM III

INTERNATIONAL PERSPECTIVES ON ENVIRONMENTAL EDUCATION

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Synopsis:

Rapid deterioration of developing world environments in the face of economic and population pressures have caused economic and environmental interests alike to seek forms of development that are ecologically sustainable. The challenge is enormous and areas most threatened environmentally are often those least able to respond due to the food, fuel, and fodder needs of their growing populations and a crushing burden of international debt.

This symposium explored the status of development and environmental protection in China, Brazil, the Soviet Union, Vietnam and Denmark and assessed prospects for future sustainability. Discussion occurred on the impact of the international development policies of Western countries, especially the United States. Special attention was given to the role of environmental education in developing popular understanding of the need and methods for sustainable development. Emphasis was placed on ways for EE to reach decision-makers.

Session I: Contributed Papers

ENVIRONMENTAL EDUCATION IN SOUTH AMERICA
EDUCATION FOR THE FUTURE

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The word development has several meanings and it is conceptualized in different ways. According to the World Conservation Strategy document prepared in 1980 by the International Union for Conservation of Nature and Natural Resources (IUCN), development is "the modification of the environment and the use of resources to satisfy human needs and improve the quality of life". For development to be considered sustainable it must take into account the interaction of social and ecological factors as well as economic ones of renewable and non-renewable resources and the long- and short-term advantages and disadvantages of development strategy adopted. As a dynamic process development must not only meet the present needs but also maintain the prospects for the future.

The development strategies chosen by many South American countries for a rapid modernization during the past decades has been based on short-term development policies, usually at the cost of long-term benefits, and with emphasis on intensive exploitation of natural resources. In an attempt to reach higher levels of development, many of these nations have not taken into account the protection of either their environment or natural resources, upon which the development process is based. The effects of inappropriate development procedures have accelerated degradation and/or depletion of the resource systems--soils, water, air, plants and animals--which support human life. The ecologically destructive approaches have also undermined the chances of those nations for a long-term productivity of their natural resources or a more sustainable form of growth.

The issues such as economic well-being and environmental deterioration have been proved to be closely connected and interdependent. The financing of ecologically destructive development projects has not only unstabilized those nations' economies with a drastic increase of their foreign debt, but also they have increased their environmental deficit through an excessive borrowing of resources. Most of this resource depletion can be avoided through better resources management. This means ensuring that life support systems continue to function effectively--that the fertility of soils is maintained, the waters remain clean and productive and the air is fit to breathe.

The environmental problems in South America are considered to be severe and call for immediate and innovative action. The solutions for these problems require knowledgeable, highly skilled and motivated professionals. Therefore, environmental education plays a key role in providing for all ages, at all levels and in both formal and non-formal eduction, the necessary stimuli for the development of an awareness and a sensitivity to the environment and its problems. It also prepared the individuals working in the fields of education, communication, conservation, policy-making, environmental planning and analysis, natural resources management and development strategies to be responsive to a rapidly changing world, to understand contemporary world problems, providing the skills needed to perform effectively in the improvement and protection of the environment. Environmental education is an investment in future generations; it will help them in developing a sense of responsibility and a commitment to the future, preparing them to carry out the role of defending and improving the environment.

INTERNATIONAL INITIATIVES IN ENVIRONMENTAL EDUCATION - 1988-89

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I. Introduction

The International Society for Environmental Education (ISEE) has been very active recently in promoting environmental education around the world. Beginning with the UNESCO-UNEP Congress in Environmental Education and Training in the summer of 1987 in Moscow, USSR, the ISEE has been working to promote education on the biosphere by developing a global network of environmental educators through communication, curriculum development and review and support.

2. The UNESCO-UNEP Congress on Environmental Education and Training, 1987, Moscow, USSR

The ISEE introduced and obtained unanimous approval of a resolution designating the decade of the 1990s as a decade to promote biospheric educational programs. The conference summary (UNESCO-UNEP, 1988) states the resolution in Articles 149 and 150.

> Article 149:
>
> "Taking account of the fact that worldwide development of environmental education is a lengthy and complex process, and the need for advance planning, it is desirable to designate 1990-2000 as a 'World Decade for Environmental Education.' Programmes developed for this decade should emphasize interrelationships between people and the biosphere in their full range of economic, social, political, cultural, and ecological manifestations. It is suggested that UNESCO and UNEP be designated as the leading agencies for programme planning and coordination and developing criteria for evaluation of progress."
>
> Article 150:
>
> "In view of the fact that the worldwide development of Environmental Education and Training is a lengthy process, and that educational environmental and development problems are bound to change during the coming decade, it is envisioned to hold another international Congress in Environmental Education and Training in 1997 to take stock of the progress achieved and to draw up, in the light of needs, priorities and means, an Environmental Education and Training plan of action for the first decade of the twenty-first century."

3. ISEE International Initiatives

The International Society for Environmental Education is working with UNESCO-UNEP to implement the biosphere education program. The ISEE is currently seeking official recognition from UNESCO as a "Non-Governmental Organization (NGO)." The ISEE is also working with UNESCO to produce and review environmental education curricula worldwide.

To foster communication and support for environmental educators, the ISEE is continuing to develop its network of members, publishes the newsletter Biosphere for information and communication, and will sponsor an international conference on environmental education in the fall of 1989.

4. The International Conference on Environmental Education, October 3-7, 1989, Goa, India

The ISEE will help to sponsor the Third International Conference on Environmental Education from October 3-7, 1989 in Goa, India. The conference will feature several keynote addresses, paper sessions, and cultural events to encourage participation from as wide an international audience as possible.

REFERENCE

1. UNESCO-UNEP, 1988. "International Strategy for Action in the Field of Environmental Education and Training for the 1990's." UNESCO, 7, Place de Fontenoy, 74700, Paris, France.

Session II: Panel Discussion Summary

In addition to the participation of the Symposium organizers and the presenters in Session I, the panel featured brief presentations from professors Le Dien Duc of the Faculty of Biology of Hanoi University and Soren Breiting of the Institute of Biology at the Danish School of Educational Studies:

ENVIRONMENTAL RECONSTRUCTION IN VIETNAM

Le Dien Duc
Vietnam

Dr. Duc, who is coordinator of Vietnam's Waterbird and Wetland Working Group, described Vietnam's environmental reconstruction programs since the Vietnam War and the beginnings of environmental education in Vietnam. A number of major environmental problems existed in the wake of wartime devastation, especially deforestation and defoliation from herbicides such as napalm and Agent Orange and resulting erosion and siltation. Some two million hectares of rain forest and mangrove were destroyed, primarily in central and south Vietnam, and many dams and irrigation systems were lost to silt.

In 1980 Vietnam established a national program of resource utilization and environmental protection. This program includes protection of endangered plants and animal species, development of national parks and protected areas (87 acres designated to date), and restoration of habitats (30 million damaged hectares will be affected in a ten-year replanting program). Local people and school children have been involved in the replanting effort. To date residual effects of Agent Orange on soils and fish do not seem to be serious.

Vietnam is beginning a program to control air and water pollution as well as environmental assessment and environmental law studies. One working group has been established to develop environmental education. Much needs to be done in environmental education as Vietnam has little teacher expertise and funds are scarce. Vietnam would like American assistance as relations between the two countries improve.

There has been some success in environmental education. A good elementary/secondary biology curriculum with ecological and cultural components exists. Posters and books on birds and wildlife are being prepared with the assistance of the International Crane Foundation and a grant from West Germany. A videotape has been produced on the offshore islands near Ho

Chi Mien City, a weekly radio program exists on environmental protection, and national and local newspapers give coverage to wise use of resources.

Vietnam also observes World Environment Day on June 5 with regional and national conferences sponsored by natural resource, education, water and forestry agencies, and has begun to use the World Conservation Strategy as a guide.

Population education is also a high priority as Vietnam has 70 million people and a 2% annual growth rate. Economic development, environmental protection, and effective long range planning all depend upon controlling population. Family planning is developing in rural areas and a one-two children per family limit is encouraged. Success has been limited, however, because of the emphasis upon having sons and the fact that family planning must be achieved through education rather than legislation.

ENVIRONMENTAL EDUCATION IN DENMARK

Soren Breiting
Denmark

A small country of 5 million people, Denmark has no large wilderness areas, but Danes have high regard for wetlands, woodlands and their coastline. Denmark produces five times as much food as the country consumes. Danes are careful stewards of the land and have a "Small is Beautiful" attitude toward the environment. Due to the high level of awareness of environmental problems and stiff environmental regulations, some industries have moved their operations to other countries.

Environmental education has an important place in the school curriculum throughout Denmark. EE programs emphasize the study of local environmental problems and are sometimes criticized by politicians as "potentially dangerous" because of the conflicting interests and larger than local issues such studies identify.

Denmark has experimental EE programs in 25 schools. The Institute of Biology has assisted with pedagogical innovations and helped produce a book of local environmental materials. The book emphasizes local to global connections and is being used in a program which has a goal to involve 5,000 teachers in environmental education study groups. About 500 teachers participated during the past year.

An international EE Conference will be held in Copenhagen in May 1989. It will focus on long term action perspectives for EE and seek participation from North America. The Conference agenda will include exploration of ways to promote sustainable development and wider awareness of a common global future.

Efforts are being made to include health and wellness issues in the EE curriculum. In incorporating the World Health Organization's concept of physical, psychological and social well being, the aim is to link closely personal and environmental health. Such a broad definition also helps in the development of positive environmental values.

Summary of Panel Discussion

During the discussion a variety of opinions were expressed by panelists and others who attended the symposium. Several of these are summarized below. No attempt was made to gain agreement on the validity or importance of views discussed.

1. Effective environmental management is assisted by participation of local people who live in the area in question. Empowerment of those individuals and communities who have a direct stake in environmental decisions can promote responsible environmental behavior. Environmental education plays a key role in providing understanding of the environmental issues involved and serves a basis for responsible action.

2. Environmental educators must be willing to make contacts with business executives and politicians in order to foster dialogue and cooperation with decision makers on environmental matters.

3. Increased attention should be called to the devastating environmental effects of war and burdens of international debt, effects experiences primarily in the Third World. Moreover, unjustifiably high interest rates and corporate profits may significantly reduce the availability of capital critically needed for development and environmental protection.

4. It is crucial to reach children with positive environmental messages in order to instill long term environmental values effectively.

5. The seeming resurgence of democratic or ostensibly democratic governments around the world may bode well for the environment. Authoritarian military governments are often insensitive to the environment and are more likely to incur heavy debts for shortsighted economic gains.

CONTRIBUTED PAPERS

EDUCATION AND BIODIVERSITY: ANALYSIS OF NEEDS AND SOME SUGGESTED ACTIVITIES

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Educational efforts in many natural areas of the United States traditionally have focused on the species present and natural history topics. Off-site educational efforts generally reach limited audiences and focus on superficial information related to the agency doing the program. Despite the enormous growth of conservation literature, environmental education curricula, and peace education materials, education about the maintenance of Earth's biological life support system is not widespread nor integrated into formal or non-formal educational planning. Efforts often are not substantive, too anecdotal, or without sufficient local examples.

The educational planning about the preservation of biodiversity of a regional landscape must become an integral part of both preserve management schemes and public education. Focusing on examples from a local region can offer a personalization to the struggle for environmental sustainability and security.

Educational efforts about preservation must be built upon the realities of that regional landscape. Preservation efforts that prevent extinctions on a regional scale actually may depend on (1) the willingness of conservation organizations to integrate educational planning into strategic stewardship planning, and (2) the willingness of educators to present regional processes and environmental phenomena to students in a holistic way, fulfilling their need for both concrete and abstract experiences.

This study was an attempt to determine the needs in teaching about biodiversity and develop materials that could provide assistance to both professional educators and natural resoufce managers on possible educational programs. Earth's flora, fauna, and the ecosystems in which they are found can benefit greatly from more widespread understanding of the dynamic interactions between humans and the landscapes which are human-dominated.

It is hoped that the needs identified here and the materials developed in this study would contribute to a variety of types of programming. The translation of current resource on biodiversity into viable learning activities could contribute to affecting management policies and eventually affecting the status of regional ecosystems.

Procedures

This study consisted of two parts. Part one involved collecting information in order to determine the validity of the hypotheses given above. In essence, this part served as a needs assessment for determining the content of the materials developed. Part two involved the development of the educational materials for use in natural areas. The materials developed then were based on the unique characteristics of natural areas rather than zoos, botanical gardens, or standard classrooms, incorporating, in particular,

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evidence of global issues. These materials were then evaluated formatively for the purpose of compiling a source book at a later date.

Populations Studied

The first part of this study involved gathering information from a variety of sources. These included: (1) preserve managers, (2) interpretive naturalists/environmental educators, (3) published ecological reports, published educational materials that included activities to engage students in learning about conservation or preservation, and (4) scientists involved in research and activism on this topic.

The second part of the study involved synthesizing the information gathered in part one (the needs assessment) and developing activities for teaching about biodiversity in natural areas. The activities were field tested formatively on volunteers at the Center for Science, Mathematics and Technology Education, SUNY at Stony Brook, and students enrolled in an environmental issues class at the State University of New York at Stony Brook. In addition, comments were selected from land managers, ecologists, teacher educators, and environmental educators and naturalists. Then the materials were revised as needed.

Several instruments were used in gathering information for this study. These included: (1) the structured interview questionnaire for scientists, land managers, and environmental educators; (2) a letter sent to major conservation organizations requesting educational materials related to this topic and/or research reports on natural areas; (3) a letter sent to preserve managers requesting educational materials and/or research reports; (4) a rating scale sent to preserve managers soliciting their responses concerning their management efforts and educational efforts on this topic; (5) a checklist sent to the preserve managers concerning the threats to biodiversity which occur on their preserves and the evidence available on it; (6) the activities evaluation forms filled out by the volunteers and the students enrolled in the environmental issues course.

Results

Questions on the survey requesting what the constraints were to integrating environmental issues into educational programming presented revealing information. On both federally managed lands and state managed lands, the common theme expressed was that visitors generally could not receive in-depth presentations because they were just casually enjoying their leisure time. The respondents expressed concern at incorporating environmental problems (issues) into presentations because they were perceived by the public as negative and set the public on the defensive. Responders believed that public support for the refuge or parklands management policies would diminish. Issues were considered to be "negative programming" by the natural areas managers.

Despite this perception, the public servants indicated their recognition of the need for public education about land-use issues. There has been a long-standing tradition (mission) on the nation's public lands to communicate research results from public lands to the public in the form of educational programming. There was expressed, however, the common concern about issues education and biodiversity because many did not want to alienate sectors of their visitorship, for example employees of a corporation which may have direct involvement in pollution to lands and waters of the area.

Among privately-owned preserves, the same problem was revealed. Despite the recognition of the importance of incorporating issues into educational programming, the concern was expressed, several times, that people need to enjoy their visit to the preserve without being preached to. Private preserves have viewed their mission as one of education, not necessarily advocacy, so there was a reluctance revealed to "campaign" on issues. Issues were not considered "positive programming," and, as negative programming, issues have not attracted as many people as non-issues-oriented nature programs or self-help programs.

There was the common mission expressed in the survey of sharing the love of nature and needing to get more people first to understand their relationship to the natural world so that they would be willing to take a position on an issue later on in their communities.

Results of the structured interview presented an interesting set of needs which could form the basis of activity development.

Scientists

- maintenance of natural systems--biodiversity is just a part of that; (fire has played an important role; herbicides are not part of the natural system);
- make connections between issues and the public's concerns;
- use the arts to get across issues;
- teach processes, patterns, behaviors of organisms--not just identification;
- use the tools (control, replication, randomization and precision) and the processes of science;
- focus on inquiry and/or discovery (see and interpret for yourself);
- integrate cultural history of the area into environmental history.

Land Managers

- emphasis on the destructiveness of exotic (introduced) species to the native flora and fauna;
- teach about the fragmentation of wild areas (the changes to plant and animal populations due to cutting trails, or worse, and the resulting shift to "edge-adapted" species rather than interior species);
- the importance of habitat protection; (destruction or elimination of habitat is the number one problem relating to loss of biodiversity);
- issues incorporated into education about biodiversity, such as causes of fragmentation to habitats;
- incorporate the historical precedence set in this society and country towards deforestation; (relate to Europe, tropics);
- relate the subject of environmental issues to stress tolerance that every organism possesses; (every organism is an indicator organism, but some give stronger indications of stress than others at lower thresholds);
- emphasize how our natural heritage made us what we are today;

- stress processes, not identification;
- relate their activities in everyday life to specific kinds of threats to biodiversity in their communities;
- relate the patterns, processes of the landscape through the arts as well as the sciences, even in the field.

Educators

- Since people are even more alienated from nature due to the rise in the number of cases of Lyme disease, there must be even stronger efforts in education on behalf of preservation of biodiversity;
- form and function, on the species level, is important to teaching about biodiversity;
- need to link educational efforts to developing a "land ethic" or conservation ethic rather than on loss of biodiversity, especially for young children;
- need to develop strategies and networks for building for our children a viable coalition of support for land ethic, i.e., in the classroom, in the neighborhood groups, in the homes, in the churches and synagogues.

Developing the Activities and Investigations

In general, it can be said that this sourcebook focuses on: (1) developing an awareness of biological diversity and (2) the major threats to it that occur worldwide, using examples from the Long Island area. Subsequent activities need to be developed on the aspects not covered here: how to maintain or restore biodiversity.

This book is intended as a sourcebook for naturalists, park and preserve managers, or teachers with some field experience in biology, ecology, or natural history. It is designed to provide ideas for leading investigations in the field relating to biodiversity and the threats to it.

The ideas for activities came from recent research reports in the area of landscape ecology and conservation biology. These reports are listed at the end of each activity.

The activities and investigations are, generally to be done outside. Several require simple collecting equipment that often can be made easily. The activities are intended to introduce the participant to an aspect of biodiversity, using discovery methods, and requiring field observations. The investigations focus more on observing, data collecting, interpreting the data, and replication.

In conclusion, it is important to emphasize that we must begin to recognize and preserve natural diversity. The differences expressed among individuals or groups (populations) of a species are a form of biodiversity, and these differences are the strength of each species. Our ability to respect this diversity may have a bearing on our ability to respect and sustain the diversity within our own species.

NOTE: Additional material available from the author.

LAND USE PLANNING: THE NEW OREGON TRAIL

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> "Oregon has, by a combination of luck and fortuitous public policy - and blind optimism - hit on the best land use system in the United States of America. There's no question about it. Land Use planning is the synapse between private and public ownership."
>
> Mike Gleason, Eugene, OR, City Manager
> (Hoy, 1987)

Introduction

In 1973, the Oregon State Legislature passed Senate Bill 100, "The Oregon Land Use Act," creating the "Oregon Land Use Planning Program." The program was established to conserve sensitive and valuable lands, to promote sound economic development, and to retain local control over land use planning within a framework of goals and guidelines established by the State of Oregon (BGRS, 1984; Leonard, 1983).

Senate Bill 100 (BGRS 1984):

- Established the Land Conservation and Development Commission (LCDC) with seven members appointed by the Governor.
- Created the Department of Land Conservation and Development (DLCD) to provide staff functions for LCDC.
- Directed the Land Conservation and Development Commission to establish statewide planning goals.
- Required all cities and counties to prepare and adopt comprehensive plans consistent with statewide goals.
- Required state agency plans and actions to conform to LCDC goals and to city and county comprehensive plans.
- Required all cities and counties to enact zoning, subdivision, and other regulatory ordinances to implement the comprehensive plan.
- Directed LCDC to review all local comprehensive plans and implement ordinances for conformance with statewide goals.
- Required widespread citizen involvement in the planning process at local and statewide levels.
- Allowed for appeals from local decisions alleged to violate state goals.

Table 1. Oregon's Statewide Planning Goals (BGRS, 1984; Hoy, 1987). All goals were adopted in December of 1974 unless indicated ( ).

I. Citizen Access
- 1. Citizen Participation
- 2. Land Use Planning Process

II.
- 3,4. Conserve Forest and Agricultural Lands
- 5. Conserve Open Space, Scenic and Historic Resources
- 6. Air, Water and Land Quality
- 7. Conserve Lives and Property from Natural Disasters
- 8. Promote Recreation

III. Growth and Development
- 9. Economic Diversification
- 10, 11. Housing, Public Facilities and Services
- 12. Transportation
- 13. Energy Conservation
- 14. Planned Urbanization
- 15. Willamette River Greenway Protection (1975)

IV. Coastal Zone Protection (1976)
- 16,17,18,19 Protect Estuarine, Coastal Shorelines, Beach and Dune, and Ocean Resources

In 1974, after a year of public workshops and hearings (involving literally thousands of citizens and local officials from around the state), the Land Conservation and Development Commission (LCDC) adopted 14 statewide planning goals (see Table 1). In addition, the LCDC formally adopted a Willamette River Greenway goal in 1975 and four goals to guide the preservation and development of coastal resources in 1976.

The Oregon Land Use Program was controversial from its very inception. Three state-wide ballots to eliminate the program were rejected by voters in Oregon in 1976, 1978, and 1982. The 1982 defeat was particularly important because it occurred during a period of deep economic recession and at a time when many communities and counties were grappling with the harsh realities of land use tradeoffs in plan formulation.

Current Issues

On August 7, 1986, the LCDC approved or "acknowledged" the last of the 277 city (241) and county (36) land use plans. Thus, all city and county plans have now been approved, with many now undergoing "periodic review" by the DLCD. It has now been 15 years since the Oregon Land Use Program was enacted, and three issues have surfaced as the most important in program implementation: economic development, rural resource lands, and wetlands conservation (representing, in general, the conservation of valuable or sensitive resource lands).

A. Impact on Economic Development. In 1982, Governor Atiyeh appointed a "Task Force on Land Use in Oregon" to determine whether or not the land planning program was inhibiting the state's economic development. To the surprise of many, the task force found little evidence that the program was detrimental to economic development.

Since that time, the program has been gaining in support and popularity among both conservation and development interests. By 1984, opponents of the land use program failed to collect sufficient signatures to place a fourth challenge on the ballot. According to former Governor Atiyeh (Hoy, 1987):

> "Before all the plans were acknowledged, we had, in effect, an ad hoc moratorium on development. Now we can show our prospects land that is set aside - unquestionably - for that purpose. And they know that once they make their investment, everything else around them will follow the plan."

Two recent reports on the future development of Oregon have concluded that the state's land use program actually may be a source of economic growth to the state through the protection of basic resources and by fostering the development of the clean technology, service and tourism and recreation sectors of Oregon's economy (Oregon 2000 Commission, 1979; Commission on Futures Research, 1986).

B. Impact on "Rural Resource Lands". The Oregon Land Use Planning presently requires major urban areas in the state to have a specified urban growth boundary and mandates the careful definition and conservation of rural agricultural and forest lands. However, many "rural resource lands" are poorly suited for agricultural and forestry uses, including:

- areas in the urban fringe;
- areas of prior rural commercial or industrial development;
- areas of prior rural residential development;
- areas consisting of small parcels of land;
- lands with physical limitations to agriculture or forestry.

In August of 1986, the Oregon Supreme Court (1000 Friends v. LCDC and Curry County) held that an extensive urban development in a non-incorporated (outside an urban growth boundary) rural area of Curry County was not permitted under the State's Land Use Program. Up until this time, the trend of counties was to allow non-farm development in rural areas designated for agricultural or natural resource use--in apparent violation of Goals 3, 4, and 14 (Table 1). Although the Supreme Court prohibited urban development in rural areas, it left to the LCDC the task of formulating guidelines to manage development in rural resource lands (1000 Friends of Oregon, 1987).

The most likely outcome of the debate will be the establishment of two rural lands categories. A "primary resource land" category will be designated to preserve large viable tracts of agricultural and forest lands, and a "secondary resource lands" or "marginal lands" category will be established for fringe, previously developed, small parcel, or physically unsuitable lands where some development would be permitted. It is important to note that the citizens' land use watchdog group, "1000 Friends of Oregon," opposes this new designation. They point out that over 90% of the "rural development lands" (totalling over 800,000 acres), have already been excepted by counties from

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development restrictions in Goals 3 and 4 -with over 95% currently zones for residential construction (1000 Friends of Oregon, 1987).

In an attempt to resolve this conflict, the 1985 session of the Oregon State Legislature authorized the LCDC to develop a "secondary lands policy," to be completed by 1987. The LCDC deadline was later extended to December 31, 1990. Many city and county planners are advocating the development of a new land use "Goal 20" entitled "Secondary Resource Lands" to designated primary and secondary lands and to specify appropriate land uses for each category. The issue is of significant regional consequence because many of the rural eastern Oregon counties have few large incorporated communities (Ross, 1987).

C. Wetlands. Despite the Land Use Planning Program, wetland losses in Oregon are significant. For example, since 1978, an estimated 11,000 acres of estuarine wetlands have been lost along the coast - representing more than one thousand acres per year (Wick, n.d.). This loss of wetlands recently prompted the U.S. Environmental Protection Agency (US EPA) to call for a reduction of "at least 50%" in the annual rate of wetland loss in the Pacific Northwest (US EPA, 1986).

The Oregon wetlands management program is generally considered more comprehensive than required by federal law under Section 404 of the 1972 Clean Water Act. The Oregon wetland program is administered by the Oregon Division of State Lands (DSL) which reviews applications and issues permits for all wetland dredge and fill activities. The state recently proposed to consolidate all US EPA and Army Corps of Engineers authority for wetlands management with the state DSL. If accomplished, Oregon will be the first state in the nation delegated such authority (Rogers, 1986-87; US EPA, 1986).

One of the major weaknesses in Oregon's wetland management program is the lack of a comprehensive inventory of wetlands. To date, most of the wetland management activities rely on DSL permit records. Although Goal 5 (Natural Resources) requires local freshwater wetlands inventories and Goal 16 (Estuarine Resources) mandates wetlands and estuaries be recognized and protected, there has yet to be attempted a comprehensive state-wide wetland inventory, and there is no uniform definition of a "wetland" for use by a local government in comprehensive planning. The LCDC, DSL, US Army Corps of Engineers, and the US Fish and Wildlife Service all currently operate under differing definitions.

Another problem with the Oregon wetland program is the amount of discretion afforded local officials in identifying and protecting local wetlands in comprehensive plans. Although the LCDC began including wetlands in the periodic reviews of comprehensive plans nearly two years ago, local development decisions seldom reflect federal and state regulations. Complicating the local problem is the lack of a coherent state (LCDC or DSL) policy pertaining to the definition and level of state-wide protection afforded wetlands. Without a state-wide definition, inventory and/or specific wetlands preservation authority or policy, wetlands will continue to be lost within the state at an unacceptable rate (Berner, 1985).

III. The New Oregon Trail

As previously noted, Oregon's Land Use Planning program is not without fault. However, its successes have prompted the recent adoption of similar systems of land use planning in Vermont and Maine.

Vermont. In 1988, the state of Vermont enacted Act 200, "An Act Relating to Encourage Consistent Local, Regional, and State Agency Planning." The thirty-two goals established by the Act (see Table 2) are to be addressed in the comprehensive plans of communities, regional planning commissions, and state agencies.

Vermont's new land use planning replaces the old program enacted in 1970 by the Legislature, commonly called Act 250. The State of Vermont authorized $27,250,000 to initiate the new program in 1988, with subsequent funding provided by a real property transfer tax allotment of $7,250,000 per year.

The major different in Vermont Act 200 from Oregon Senate Bill 100 is the authority of regional planning commissions in Vermont to:

- solicit citizen participation in the planning process;
- determine planning assistance needs of local governments;
- review and approve municipal plans based on the state-wide goals and policies;
- to adopt regional plans compatible with municipal and state agency plans and the state-wide planning goals;
- develop regional data bases and maps of existing and planned land uses.

Act 200 also establishes a "Council on Regional Commissions" to review regional and state agency plans for consisting with the new state-wide goals.

Vermont Act 200 does not require, but only encourages, municipalities to adopt plans and implementation programs consistent with the state-wide goals. However, strong incentives exist in the form of technical assistance, planning assistance funds, state economic development and pollution control funding, and state agency administrative actions. Further, large scale development permits must be obtained from the Vermont Environmental Board.

Maine. Maine's 1988 Comprehensive Planning and Land Use Regulation Act affects areas of state-wide concern or vital state interest. The three goals of the Act are to:

1) Encourage orderly growth and appropriate development;
2) Protect the State's rural character and to safeguard its agricultural and forest resources from development;
3) Promote and protect the availability of outdoor recreation opportunities.

The Maine land use planning law is similar to that of Oregon and Vermont in its requirement for municipalities to encourage citizen participation in the development of local growth management programs. Municipalities are not required to adopt growth management plans, but incentives are provided to communities to do so (planning assistance, economic development and public facilities grants, etc.).

Comprehensive plans developed by municipalities in Maine must be based on a land use inventory and analysis and be consistent with the state-wide goals and guidelines.

IV. Conclusion

Fifteen years after its passage, the Oregon Land Use Planning Program has many significant achievements.

1) The protection of nearly one-half of the private land in the state for agricultural and forestry uses.
2) The conservation of valuable and sensitive natural resource lands.
3) The establishment of the requirements and goal and policy framework for comprehensive planning of every major city and county in the state.
4) The use of urban growth boundaries to channel and manage urbanization efficiently and effectively.

The overall success of the Oregon Land Use Program can be attributed to its emphasis in local control and to dual goals of conservation and development. These goals also appear to be themes central to Vermont's and Maine's new land use planning programs. However, fifteen years after its initiation,the Oregon Land Use Program is just now grappling with the significant issues of rural development and natural resource lands conservation. Thus, it may be yet another decade before the program is completely operational and realizing its full potential in fostering economic development and environmental conservation.

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OUTDOOR EDUCATION IN SASKATCHEWAN

Kenneth Boyd

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In order to give a clear picture of Outdoor Education in Saskatchewan, I feel that I should give some information about the province and the environment in which we are offering this education. Our area, location, size, weather, etc., differ very greatly from the areas most of you call home.

The province of Saskatchewan is 251,700 square miles (651.900 square kilometers) in area. It is 760 miles long and 393 miles wide. Of this, 31,518 square miles is water. Population is just over one million. The climate varies with the season. This variation enables the people to experience the seasons and the activities in which they are able to participate. The summers are hot, 90 F or higher, while the winters are cold, minus 40 F or lower. Saskatchewan's past history and physical features have given the people of the province an excellent learning facility.

Saskatchewan does not have any school residential camps. As a result, educators must utilize the natural surroundings to help them educate the students outdoors. This, in turn, brings the students into close contact with the multicultural aspects of the province.

The province was first explored as part of the early fur trade routes. These fur routes are still the main travel routes of the area. The signs of the early fur trade can still be seen today (worn paths,sites of forts). The native influence is also clearly visible (settlements, rock paintings).

The early settlers of Saskatchewan came from many different parts of the world, and settled in groups throughout the province. The names of many cities and towns show the influence of the different groups.

The province offers a wide spectrum of environments for one to study. The southern part contains plains (agricultural), badlands, and sandhills (desert). The northern portion is lush forest, abundant waterways, lakes, streams, and waterfalls.

University training in outdoor education is at the elementary and secondary level. Both the winter and summer environment are studied. This enables teachers to utilize any season in their programs. It is even possible to achieve a degree in Outdoor/Environmental Education at the University of Regina.

All Outdoor Education students' pursuits are in the outdoors as part of their training. The OCRE (Off-Campus Residential Experience) runs for three days at the elementary and secondary level, with one day as overlap. Fort San is now a residential training area situated in the Qu'Appelle Valley.

The winter environment courses cover such topics as equipment needs and preparation. Cross-country skiing and snow-shoeing are integral parts of the course. Shelter construction is discussed. Much of the time is spent in mastery of these skills through several winter camping trips. Not only are these skills educational, but they can also prove very practical in a survival sense.

The summer environment course runs for three weeks during the month of August. This is a rather unique course, as the students are in the northern part of Saskatchewan in an outdoor setting for the full time. During these weeks they are canoeing on one of the best white-water routes in the province. Compass work, menu planning, and sharing of the workload are all stressed. At the same time, a cultural/historical explanation of the area is an integral part of the whole learning process. There are usually one or two native students who take the course each year. This really adds to the multicultural experience (experiences, language, culture). Students must keep a daily diary of their trip, where they outline impressions, things of interest, problems, general reminders, and experiences.

Teacher education is a four-year course in the province of Saskatchewan. The salaries of teachers vary according to the level of education. A teacher is placed in a "class" on the salary grid. For example, Class I, II, III, IV, V, and VI. Class IV is one degree and Class VI is the master's level, top of the scale.

In Saskatchewan, salaries are negotiated provincially, and local boards of education must abide by them. In salary, there is no distinction between small town and large city schools, if the qualifications are the same. The province does not have many large centers, so it is necessary to staff the schools in the rest of the province with qualified teachers. In line with this, towns have what is known as composite schools, well equipped, well staffed, and the students are bussed.

In most of the schools in Saskatchewan, Outdoor Education is handled either as part of the classroom activity or as a group (club). This usually means that it is an on-going yearly program. The Department of Education for the province has established guidelines to help teachers who wish to implement Outdoor Education as part of their curriculum.

It is felt that it is important to make sure that the students have good equipment and have received training in the type of activity in which they are going to be taking part. Students should be involved in all aspects of the trip organization as much as possible. This makes for a more smoothly run program.

There are numerous parks in the province (both provincial and national) that offer ideal settings for students to learn. Prince Albert National Park is visited by many groups. The camping, canoeing, and hiking are excellent. One of the big drawing features is the home of Grey Owl. Born Archibald Belaney in 1888 (England), he was raised by two maiden aunts. He was fascinated by stories of the North American Indians. He came to Canada, lived with the Ojibwa in northern Ontario, and married an Iroquois woman, Anahareo. He began to dress like an Indian, and she taught him the joy of conservation. He would tour, giving lectures on conservation. Grey Owl worked for Parks Canada in their beaver conservation program, and lived in a cabin in Prince Albert National Park until his death in April, 1938. Only at his death did most people learn that he was not a North American Indian. The hike to his cabin is made by countless students every year.

An area of rugged beauty few people get to experience is the badlands of Saskatchewan. This area is very much like the badlands of the northern United States. The landscape is filled with buttes and caves. Outlaws used to cross from the United States to Canada to hide out--even such notable characters as Butch Cassidy and the Sundance Kid.

The Cypress Hills area is the highest elevation in the province. The North West Mounted Police (R.C.M.P.) established a fort in the area to bring stability, law and order. They won the confidence of the local population. Here, also, Sitting Bull and his braves came after the attack at Little Big Horn where General George Custer and his men were killed.

The Saskatchewan Outdoor and Environmental Education Association is a non-profit volunteer organization designed to help educators to utilize outdoor and environmental education and to instill an interest in these areas. It does this by publishing a newsletter; hosting seminars, workshops and conferences; arranging speakers; and giving presentations. It is also actively involved in presenting briefs and guidelines to the provincial Department of Education in the areas of outdoor and environmental education on a continuing basis.

Outdoor Education allows one to tie many learning experiences together, along with the unexpected. Perhaps the greatest contribution Outdoor Education seems to make is how easily and readily the students learn. The experiences bring out hidden talents and interests (character development). The students eagerly take part in the various activities. Most do not realize that the added physical involvement is also benefiting them. The enjoyment that they derive from Outdoor Education makes the whole process worthwhile.

So, leave the four walls of the classroom behind; the learning process does not stay in the classroom--if anything, it expands to meet the outdoor challenge.

KEEPERS OF THE EARTH:
THE ABENAKI NATION OF NORTHERN NEW ENGLAND

Michael J. Caduto
Norwich, Vermont

We walked down to the shore of Queneh-tah-cut (Connecticut) to launch the first canoes. I was co-leading a canoe trip of 20 people for the Connecticut River Watershed Council along with John Moody, a historian, and Joseph Bruchac, a well-known author of Abenaki descent.

Bruchac walked to the edge of the water. "This is our brother Queneh-tah-cut, 'The Long River'," he said. "Today we will be riding on the back of this river. It is right to ask its permission for our passage. I invite all of you to do as my ancestors would have done. Come down to the river and, in your own way, talk to it, ask its permission, and give thanks for the gift of our journey."

Meanwhile, Moody walked along the bank and sprinkled sunflower seeds as he prayed to the Abenaki Creator Tabaldak, using the traditional greeting of "Grandfather." Through this act Moody gave a gift to the river and its banks as a way of showing respect and appreciation for the gifts the river was about to give our group.

For at least 10,500 years the Abenaki people of the Vermont and New Hampshire region have lived the circle of giving and receiving with the natural world. While many people today talk of Native North American cultures as if they were one large ethnic group, each Indian nation was, and is, a distinct culture with its own spiritual beliefs and ways of relating to the Earth.

"My grandfather taught me to pour the first cup of water from our well back onto Mother Earth before taking a drink," Bruchac recalls. "It is important to give something back to the Earth whenever we take from her."

Throughout their lives the Abenakis treated nature with great respect. The individual had a relationship with the spirits of the natural world. Prayers were offered to the Owner or Creator Tabaldak in order to show respect and thanksgiving for the lives of plants and animals killed so that the Indians might live. If wild herbs were picked, many were left growing, especially the largest 'Grandmother' plant of that patch, and seeds were sprinkled in the fresh Earth left behind by uprooted plants. The bones of any animal were returned to the water or land where the animal was caught, and some of the grease was burned on the cooking fire as an offering to the Creator. Tobacco was a sacred plant used in many spiritual rites. Prayers were carried aloft to the Creator on the rising smoke. All of the parts of a hunted animal were used--nothing was wasted because this showed disrespect for Tabaldak and the animal spirits and made them angry. Many other lessons for living well with nature are revealed in Abenaki stories featuring Gluscabi or Odzihozo the Transformer and Forbidder, and Pedewadso, the Transformer. The Indians believed that living well with other people and nature were both a part of keeping the Earth in good balance. Maintaining the circle of sharing--of giving and receiving--was a central focus of Abenaki living.

The intricacies of the hunt are a testament to the intimate connections between Abenaki beliefs and day-to-day living. The following story tells of the practices that were followed meticulously:

> The hunters prepare by burning tobacco, a sacred plant whose smoke carries their prayers up to the "Owner" or Creator, Tabaldak, and the animal spirits. These prayers ask for permission to hunt. They also express the people's respect and appreciation for the lives of the animals they will soon hunt, and offer thanksgiving for the food, clothing and other gifts the animals will give the people.
>
> Some faint deer signs are found along the trail and the hunters begin to follow the trail very quietly. After a long, slow, tiring search, some animals are heard chewing on the buds of small trees up ahead. The hunters creep closer and look through the branches of a low bush. The animals are deer!
>
> The hunters look carefully at the deer in the herd, recognizing each one individually. Two of the deer are pregnant does who the hunters know are expecting fawns--these two will not be hunted. Finally, the hunters decide on a certain buck as their quarry.
>
> In an instant several arrows are strung and sent whistling through the air. The buck is shot and it falls kicking on the ground, blood flowing from wounds in its side. One deer alone is taken, because the others are needed to produce more young to keep the herd alive, and because the hunters take only what they need.
>
> The hunters quickly skin the deer, cut up the meat and lash the pieces onto a pole that is carried between them on their shoulders. When they arrive in camp people are excited to see them with their catch. "A successful hunt," a child cries out, "We will have food to eat!"
>
> The deer is not kept by the hunters and their families, it is cut into smaller pieces and given to all those who need food beginning with those who are the most hungry.
>
> As the meat is prepared, the people burn some fat on the glowing coals of the cooking fire. The smoke that drifts upward is an offering to Tabaldak. Every part of the deer is used, because to waste any would show disrespect for Tabaldak and the animal spirits and make them angry. Finally, the deer's bones are returned to the land where the animal was killed.

This offering of the bones completes the circle of giving and receiving--the Creator and deer giving life through the gifts of food and clothing to the people, and the people completing the circle by giving the deer bones back to show respect, appreciation and thanks.

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BOATER ENVIRONMENTAL EDUCATION: THE LAST FRONTIER

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The Problem

The Puget Sound basin in Washington State is fast losing its reputation as a fertile fiord. As in other urbanizing areas of the United States, Western Washington's increasing population and development have placed Puget Sound on the Environmental Protection Agency's list of estuaries of national significance; meaning that is natural resources should be protected from further pollution. One source of pollution is discharge from industrial or sewage treatment plants. This type of discharge is known as "point source pollution" because it comes from a single source such as a pipe.[1] These discharges are closely monitored and operate under a series of permits issued by the state's environmental protection agency.

More subtle forms of pollution called "nonpoint source pollution" also have residents and governmental agencies worried about Puget Sound's health. Nonpoint pollution comes from many diffuse sources such as failing septic tanks, agricultural runoff, urban stormwater runoff, forest practices and marinas or boats.[2] An education program designed to address nonpoint source pollution from boats on Puget Sound is the topic of this paper.

The Puget Sound Water Quality Authority, created by the Washington State Legislature in 1985, targeted boat sewage, among other nonpoint sources, for clean-up. Improper waste disposal by one boat owner is usually insignificant. Combined wastes from many boats, added to all other sources of nonpoint pollution, significantly degrades the Sound's waters and can threaten human health.[3]

Boaters dispute the effects of untreated sewage from boats on water quality. They argue that the level of pollutant loading from boats is insignificant compared to municipal treatment plant loadings. Boaters disagree with government studies which find correlations between boat wastes and increased bacterial contamination. Many boaters claim that unhealthy people would not be on boats and that salt water kills pathogens anyway.[4]

Many boating advocates do not seem to accept the concept that pollution can occur as a result of cumulative effects. Boat wastes, combined with the myriad of other nonpoint pollution, can lead to serious resource degradation. Federal and state agencies have conducted studies on the cumulative effects of sewage discharged from boats on water quality and shellfish. They show that shellfish concentrate pathogenic fecal bacteria. Other studies show the persistence of pathogens in the water column. Studies in British Columbia, North Carolina, Rhode Island, and Puget Sound concluded that fecal bacterial increases after boats arrive.[5]

A Three-Part Solution

The Puget Sound Water Quality Authority proposed a three-part program to eliminate boat wastes: draft legislation encouraging marinas to install sewage pumpout facilities, install sewage pumpout facilities at five marine state parks, and develop an environmental education program for boaters. The Authority believes that an environmental education program must accompany the installation of pumpout stations. Boaters must become aware of the problem, or else they will not use the stations. Education is ultimately less costly than enforcement due to the enormous number of boaters on Puget Sound.

Environmental Education as Cultural Change

Washington State Parks' new boater environmental education program faces the challenge of changing the lifestyles, traditions, and habits of boaters. The challenge is to change current waste disposal habits in the boating culture.

Boaters in Washington have a distinct culture. Culture is defined as "the way of life of a human society, transmitted from one generation to the next by learning (through language and other symbolic media) and by experience." [6] Boaters have their own language, which sets them aside from other sporting communities. For example, restrooms are called "heads;" ropes are, in some cases, called "sheets;" "bow and aft" means front and rear. The list is endless. Boaters meet in special places, such as yacht clubs, where they develop exclusive social relations. Boaters form a special fraternity. They share other exclusive symbols and ceremonies: celebrating if a boat passes over the Equator, wearing distinctive nautical clothing, following "rules of the road" while on the water, and so on.

The way a culture perceives its environment and disposes of its wastes also distinguishes it from other cultural groups. Boaters do not dispose of their wastes with complex "celebrations" or procedures. Historically, every waste product went over the side into the water. Boaters use cultural phrases such as "the fish will eat it" or "it will wash out to sea and disappear" to psychologically dispose of the problem of sewage and garbage. ("Out of sight--out of mind.") Boaters believe they need not manage their wastes, because the fish or tidal action will dispose of the wastes.

Many boaters in Washington, as elsewhere, do not perceive wastes from boats as pollution. The tradition of overboard dumping has not yet been strongly challenged. The waters of Puget Sound appear to boaters as open prairies and virgin forests did to their ancestors--an inexhaustible resource. To them Puget Sound and the oceans are the last frontier. They even manifest the rugged individualism of the frontiersmen; they profoundly resent outside interference with their boating practices. To a great extent, the frontier ethic of resource exploitation still prevails in the boating culture.

Changing the frontier ethic requires an attitudinal change for boaters. In the absence of ecological catastrophe, only education or regulation can bring about such a change.

Washington's boater environmental education program seeks to show boaters how their waste disposal practices spoil natural resources. Its aim is to bring about a change in attitude in three consecutive phases: information dissemination about boat wastes and environmental effects; development of appropriate activities and messages for specific audiences; promotion of continuing environmental awareness programs within boating communities.

Phase One: Information Dissemination. Many boaters are unaware of the effects their boat wastes have on water quality, aquatic species or human health. Developing and supplying boaters with reliable and accurate information is the first step in helping boaters draw new conclusions about their boat wastes. Armed with such materials, boaters may begin understanding and accepting that boat wastes degrade our aquatic resources. Then they may be willing to change their habit of dumping boat wastes overboard. The boater environmental education program "translated" results from government studies into easy-to-read flyers with a map showing the locations of sewage pumpout stations. A boater's reference guide was also printed describing how to properly use pumpout stations and how to handle all boat wastes.

Phase Two: Activities. Supplying information is important to begin a cultural change, but it does not necessarily mean boaters will change their waste disposal habits. Storytelling is one way to engage boaters in a more creative learning experience. It is also a subtle way to show them how they affect the water. Vacationing boaters stopping at marine state parks like to learn about the park, but they also like entertainment. State Parks are excellent places to tell stories about the sea, its creatures and the fragility of the water environment. Morals or lessons can be woven into the stories about the consequences of one's actions. Storytelling is an imaginative activity for boaters and it lets boaters draw their own conclusions about ecology.

Another way to bring information to boaters is through television videos. Students in some Puget Sound high schools had video equipment, but not many topics or themes for projects. State Parks and the U.S. Environmental Protection Agency organized a video contest between local schools. Prizes were awarded to high school students who produced the best screen plays, best visuals or best overall video documenting the effects of pollution from boats and marinas on local marine life. Television stations, parent-teacher associations, biology classes, and community groups offered to show the videos. Students, teachers and viewers, many of them boaters, learned about the environmental consequences of discharging sewage or throwing garbage overboard. Again, these viewers were free to make a personal decision to change their habits after seeing the consequences of their actions.

Phase Three: Sustaining Programs. In a third phase, long term water quality awareness programs must be nurtured within local boating communities. The environmental education program will contact Washington's ports, marinas and yacht clubs to familiarize them with the boater environmental education materials and projects. Marinas or boating clubs may be interested in further discussions about ways to clean up their harbors. For example, interpretative signs at marinas could be designed, built and maintained by boaters. Environmental interpretation not only informs, it motivates to action by questioning values, conventional wisdom or practices.[7] Creating and installing signs may foster a sense of responsibility toward the environment among boaters who work on the sign project. Another on-going project may be a commitment to self-monitoring within the marina. This may create social pressure among boaters to comply with the laws. Marina operators may want to encourage such projects in the boating community because the cost of voluntary compliance with laws may be less expensive to the marina operator than future mandatory compliance.

Conclusion

An ecological message to boaters prompts them to change their view of Puget Sound as the last frontier. The Sound can no longer be used as a commons into which they throw trash or dump sewage. Disputed data and impossible law enforcement have failed to convince boaters that they must shed their frontier philosophy. The boating culture must, as with the remainder of society, develop an environmental awareness ethic. A three-phased environmental education program starts with providing accurate information about the problems of boat wastes; followed by hosting special events; and finally, encouraging local boating communities to take responsibility for changing their own disposal habits and subsequently their culture. Washington State Parks' environmental education program seeks a change in the boating communities' traditional views about water quality. The program will have met its challenge when boaters no longer believe or say that "the fish will eat it," and instead say, "Don't splash your trash!"

FOOTNOTES

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FORMING AN ENVIRONMENTAL APPRECIATION WEB THROUGH WOMEN'S LEADERSHIP

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Throughout the years, the pendulum of educational philosophy constantly swings. Many terms, ideas, and concepts of education are created, tried, modified, or discarded. However, a major objective has been to strengthen the learning process. The intent of learning is to have individuals synthesize "pieces of information," but the general classroom methods provide minimal opportunities for assessing and internalizing the meaning of educational experiences to daily living. As environmental educators, we best understand the complex webs formed by the interrelationships of personal, societal, professional, and environmental factors.

This presentation attempts to share a course which combines several strands of life's web with personal learning experiences which are meaningful. The course is "Women and Wilderness: Explorations in Leadership." Enrollment is open to both men and women; ages range from 22 through 51. Through theoretical and practical experiences the course addresses:

1. Leadership skills and group dynamics;
2. Environmental principles, issues and attitudes; and
3. Personal, cultural and social values, concepts and skills.

The major objectives of the course include:

1. Identifying and experimenting with leadership skills and group dynamics;
2. Reading and analyzing vignettes of women in wilderness-oriented professions;
3. Examining the social, environmental, and personal dimensions which impacted and influenced the lives of the wilderness-oriented professionals with the student's own lives.

In addition to a set of compiled readings on women wilderness-oriented professions, the content involves leadership theory, group dynamics, cultural and social expectations, and psychology of self. In discussing each vignette, students respond to specific questions, such as:

> What major obstacle faced the women in their pursuits?
> From whom or where did women seek support?
> How does it relate to today's environmental issues?
> What parallels can be drawn between decision-making processes found in the vignettes and their own process?

As the major culminating activity, the class is required to participate in a four-day overnight outdoor experience. Prepared with safety and first-aid guidelines, lists for general equipment and personal gear, and basic principles for outdoor living, the class, as a group, is given less than two weeks to work out the specific arrangements, i.e., meals, tenting-mates, utensils, and other specific living and environmental considerations.

As the group gropes to take on this major challenge, the process stresses consistency in their responses with their values, knowledge and skills. Although frustration builds toward the teacher, the group bonds closer together. This helps them to make decisions, identify each others strengths, and provide necessary supports.

Through a sequencing of events, the group faces challenge's, initiatives, communications, or New Game activities. Each activity builds on the previous one. It is imperative that each of these activities be properly processed. Processing includes the implications and relationships of leadership, group dynamics, environment, and personal characteristics. Be prepared, because as students trust and feel confident, they are more apt to share their personal fears, attitudes and values. Discussions vary from topics about fear of snakes, coping with drugs, or experiences as a battered woman. Again support or listening skills are important; avoid judgments.

No matter how prepared the group feels, arrival at the site dictates new dynamics. The energy of leaders, followers, doers, blockers and complainers must be handled. The new dynamics are caused by stress from limited outdoor skills, fatigue, anxieties, darkness, and weather. Their consistency and fortitude are further tested by adding additional "contrived" situations. These situations include:

Building an emergency shelter;
Fording a major stream; and
Rescuing and transporting the injured.

In each task, processing is important for each student to grow. Questions and fears are raised. Each activity provides varying degrees of personal meaning. Slowly, openness in communication is enhanced, major anxieties are faced, requests for change are received, and a desire to learn more about themselves and their surroundings becomes evident. The frustrations are quickly recognized as learning activities and students no longer question the role of the facilitator.

This course is effective because outdoor education is important not just for the environment, but also for personal and professional growth. Learning must be internalized. Quality decisions are important to the quality of life --whether personal, professional, or environmental.

NOTE: Additional material is available from the author.

"HOW DO INDIANS WALK IN TWO WORLDS"
The Alaska Connection

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Modern-day naturalists, or environmental educators, and Native Americans have much in common. Both groups must try to walk in two worlds. The natural world and the high impact modernized world.

In my recent work with Native Americans across the northern tier of the United States and in Alaska, I've rediscovered the lack of choices with which many of these fine people have to live. Since my primary challenge has been to work with Bureau of Indian Affairs (B.I.A.) reservation schools, I have had many first-hand opportunities to discuss problems. Think about it, being moved from an ancestral area to a new environment; confined to a reservation and, in many cases, with little or no access to hunting and fishing and a nomadic life. A life which included a lot of contact with nature. In a number of cases, not being permitted to speak the native tongue. And, often severely punished for speaking in the native language. All of these impacts and changes, of course, added up to a tremendous pressure. The introduction of alcohol to tribes and reservations was another major problem. And now, satellite dishes installed in remote areas with direct access to television networks. When you think about it, without burying your head in the sand and pretending that modern times don't exist, the trade-offs have been overwhelming. I am sure most of us would agree as naturalists, educators, and environmentalists, that most all of the trade-offs and exchanges made for Native Americans have been and continue to be extremely detrimental to the individuals and the culture.

With all of that said, what can folks like us do about it and is it possible to help these wonderful people called Indians or Native Americans? Do they want our help or will they accept it?

Let me tell you briefly how I got involved with Native American communities and how it ties to the theme of this conference--building multicultural webs through environmental education.

At least a few of you are familiar with the National Audubon Society's national youth program, Audubon Adventures. We started the program five years ago for our local chapter network to address children in grades three though six with a focus on the reading age of 8 to 12 years. We used a multidisciplinary approach and a horizontal mode with the written materials, including a newsletter for every child in a sponsored school class and a leader's guide for the teacher. The program grew to 7200 classes within the first four years. A few of the original classes were Eastern Navajo Agency and Pueblo reservation schools in New Mexico. Several of the teachers on these reservations, working with the Native American students, were inspired enough with the materials to contact the office of education of the Bureau of Indian Affairs., in Washington, D.C. Dr. Henrietta Wightman, then director of education of B.I.A., examined the materials and extended an invitation to me to make a presentation at the annual meeting of the superintendents and curriculum officers of all reservation schools in the United States. This happened in June of 1986 in Albuquerque, New Mexico.

Following the presentation, Dr. Wightman requested that I find a way to provide the materials to every reservation in the country. Of course, there could be no funding from B.I.A. to make this happen. I have to admit that although this was an overwhelming challenge, I saw it as a great opportunity to build important environmental networks and partnerships with Native Americans. I recalled that if Audubon and the Cherokee Indian Nation had established a working relationship before the Tellico Dam Project disaster in Tennessee, we could have, together, saved essential agricultural lands and the important heritage in that area of Tellico Plains of the Cherokee Indian Nation. Instead, a U.S. Senator from Tennessee and congress were successful in voting the project to completion. And, at a great cost to the rest of the country, and all of us taxpayers. But, here was Dr. Wightman presenting Audubon with an opportunity to build multicultural webs through environmental education. As you well know, beginning with awareness and taking the process to action is what we are all about. This was a tailor made opportunity. After all, Native Americans, through treaties, hold some of the most environmentally significant lands in the United States. Let me just say that we took the challenge seriously and this school year we have, in the lower 48 states, 1699 Native Americans in 174 reservation classrooms participating in Audubon Adventures.

This background paved the way for involvement in Alaska. When I was meeting with special education staff in LaPush, Washington State, on the Quileute Reservation, I was asked if the network included Alaska Native Americans. Although they are under the State of Alaska education system, and not in a reservation network as are many in the lower 48 states, I was encouraged to draw Eskimos, Aleuts, and Athabascan Indians into the growing network.

Three months later I made my first trip to Alaska to attend their annual Native congress. Under consideration at the week long gathering of native delegates from around the state was the 1991 legislation. Debates concerning native rights and going public with their native corporations were all part of the congress. I joined the day and night meetings for the entire week and met many interesting Native Americans from throughout Alaska. They impressed me with their sincerity, sound cultural values, and caring ways. I also enjoyed their fellowship and good humor. This man from far away Connecticut who worked for the birds and other wildlife was a bit of an amusement to them. However, as I participated more they became more curious and opened up to me. Soon I was introduced around to many native corporation board members, the commissioner of education, and a number of native leaders. By the end of the week I had an invitation to return in February for the Bilingual/Multicultural Conference hosted by the Alaska Department of Education.

Materials in hand, I attended the conference and had an Audubon Adventures booth where most of my time was spent, except for meals and special cultural events. A great teacher from the tiny village of Telia, Alaska, in Athabascan Indian country, befriended me and was interested in becoming part of the network. Kay opened many doors to her group of teacher friends and potential for the Alaska network began to fall in place. All in all, it was a wonderful experience with lots of new friendships. At the Audubon booth, I had a signup sheet for possible participation in Audubon Adventures, and about twenty-five teachers and administrators signed up for more information.

In the spring of 1988, three months after the conference and just before the Alaska schools let out for the summer, I sent a follow up letter and invitation for those interested in the program to send me a request for enrollment on their letterhead. Four or five responses came in right away and a number of others trickled in over the summer with two very key responses in early September--the entire system in the Bethel, Alaska area. The Aleutian Region School District also enrolled all of their villages. In total, 2216 students and 242 teachers around Alaska.

The editorial I wrote in the special April 1988 Audubon Month leader's guide on the Alaska issue best summarizes my feelings--here are some excerpts:

> "Native people--the Aleuts, Eskimos, and Indians--have lived in Alaska for centuries. Their self-sufficient way of life, based on hunting and fishing, fostered a culture built on a deep respect for the land. But in recent years the exploration for oil and other natural resources has introduced 'modern' technology, values, and economic systems to the far north and eroded the Native Americans' traditional cultures and social stability.
>
> Through the establishment of Native corporations by the 1971 Alaska Native Claims Settlement Act, Congress wanted to bring Alaska natives into the commercial and corporate mainstream of America. This attempt to speed the integration of traditional societies into the modern world has largely failed.
>
> The Native people of Alaska are facing enormous challenges. They want their own lands and their own forms of government, but they also want access to the social, economic, and political institutions of the dominant society.
>
> This way of life is in great risk. It is up to all of us to take some time to learn about these neighbors to the north and help, in any way we can, to support their efforts to maintain their culture while helping them to understand the value of the wildlife upon which they depend. This year's Audubon Month, about the Arctic tundra, is a step toward building this understanding."

Focusing Audubon Month on the Arctic Wilderness area and building a network of young people in villages throughout Alaska, some of whom will be the tribal leaders and native corporation board members in the future, may add one more piece to building the awareness, appreciation, understanding and concern that will lead to action - from within the native communities - to help maintain this important culture and last frontier with vast wildlife resources.

I encourage all of you to seek out similar opportunities to build networks within the minority sector and make use of your environmental education skills and political influence to build multicultural webs.

EARTH KINSHIP: THE FABRIC OF PERSONAL AND GLOBAL BALANCE

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At the beach last week, without educators, psychologists, or spiritual leaders on my mind, I tied up a dog to prevent it from chasing migrating shorebirds. Instead of thinking about the work of these social practitioners, a clear plastic television antenna cable that I found amongst the beach debris preoccupied me. The cable served well as the dog's tether, - an unheralded spinoff from RCA and Zenith.

When I looked at Fido from down the beach, the transparent cable created an amazing illusion, for it acted like an invisible bond which prevented that hound from achieving its desire to chase wildlife. The dog would run towards a bird and suddenly, as if by magic, slow down and stop in his tracks.

It was then that the frustrating efforts of educators, psychologists and spiritual leaders came into mind, for as they attempt to help people attain healthy personal, social, and environmental relationships, invisible signals and bonds thwart their efforts, and they must deal with this problem. Their problem, however, is that they often know as little as anybody else regarding the nature and source of modern people's bonding. Why? Because they're modern people too.

Although modern science recognizes that all elements of the global life community are interconnected, we seldom fully identify these connections. They extend far beyond the plant succession, instincts and food chains that we study in ecology, yet they are the communications that allow the global life community to organize, perpetuate and regenerate itself. Since we are part of that life community, its communications must somehow also signal us.

I'm only familiar with these bonds and signals because they are expressions of Nature. While I constantly camped outdoors through all seasons for over fifteen years, the natural world exposed its affinity bonds to me and taught me to respect their messages. I've seen them create exceptional trust, unity, and compassion among and within people; they're quite different from Corporate Bonds.

More than 25 different inborn sensations like hunger, beauty, suffocation, color, and thirst invisibly bond us to our environment and each other. These affinities are the essence of Gaia, the living global organism we call Planet Earth. Like ourselves and any other living being, Gaia communicates through affinities in order to maintain its own life,and thus all life as we know it.

As our modern upbringing prepares us for adulthood, it separates us from Nature within and without. In so doing it severs our natural survival bonds--our sentient kinships with Gaia- and then attaches their raw ends to our culture with its superficial artifacts and its many unfulfilling, nature-destructive ways.

The friction generated by that mismatched connection, is the immediate cause of most environmental, social and personal stress and is the raison d'etre of modern religions. Our disengagement from Earth's self-regulating affinities also creates that untouchable villain we call "greed."

What is it about modern society that makes it uncontrollably at odds with Nature? Scientifically, if you look hard, you find that to our cost we subconsciously desire to change the natural world into a simulation of the ancient womblike tropics where we originally evolved and lived more harmoniously. That's why average Americans spend over 95% of their lives in the artificial tropics of our homes, schools and offices, excessively fortressed and programmed away from the self-regulating pulse of the natural world.

Our separation from nature's wisdoms combined with the immediate gratifications from our artificial ways, addictively program us to artificiality and create today's uncontrollable juggernaut of destructive technologies and stresses. Sadly, our attempts to eliminate these horrors without treating them as addictions is like trying to get sober by drinking martinis.

Although we can't help but recognize the disastrous results of our nature-alienated ways, modern society continues to thwart us from changing them by tabooing, rather than validating our affinities with Gaia. The mainstream usually sees feelingful, nature-supportive attitudes as unscientific, impractical, anthropomorphic, immature, economically unsound, subjective, tree-hugging sentimentality. This leaves us few alternatives and we grow up floundering in a fishy world.

The crux of the matter is that our daily pervasive rejection of our earth kinship affinities continues to make them relatively invisible and therefore unreachable for ourselves as well as the educator, psychologist, or minister. For this reason, while we strive for change, we remain subconsciously tethered by our survival feeling's attachment to destructive environmental and interpersonal relationships. That's why most Americans identify with socially responsible causes but fail to support them in some meaningful way, yet these same folks don't put hair remover in their shampoo.

In HOW NATURE WORKS: REGENERATING KINSHIP WITH PLANET EARTH (Cohen, 1987), I explain how my years living in the natural world taught me to validate natural affinities and thereby regenerate earth kinship in myself and others. I show that people's feelingful earth kinship bonds are exactly the same survival bonds that sustain all entities - from sub-atomic particles to weather systems. That's why on every level, survival is an emotional issue and why liberated survival feelings always eradicate apathy and addiction.

As I walked further down the beach I observed waves washing ashore. Each singular, throbbing moment expressed the evolving growth of billions of years of affinities between all of Earth's entities. In each wave's wash I watched the shore birds' affinities with Gaia direct them how, when, and where to cooperatively feed themselves while strengthening their environment. Newborn seal pups played with their mothers while bonding to the rhythms of the sea. And as the sea otters used stones to smash shells on their bellies, shoreline life was all it was cracked up to be.

As do our seashore wildlife populations, many indigenous, environmentally and socially sound human populations show us that their affinity bonds with Gaia give them a happy, economically sound, unifying sense of place, community, and trust. But our separated-from-nature upbringing binds us to modern society's destructive ways, not Nature's wisdom. That kind of binding is the global constipation that blocks environmental health and peace.

Over the past twenty years I've helped change occur by developing many ways for individuals to identify, reach and support their earth kinship affinities. These therapeutic, empowering techniques produce exciting benefits for people and the environment and are the core of the accredited, degree-granting National Audubon Society Expedition Institute. But outside the Institute it's also possible, once you know how, to teach earth kinship in school, at home, and in counseling settings. It has proven even more effective and longer lasting than Excedrin, with social and environmental benefits to boot.

To achieve such benefits, we must weave earth kinship relationships into modern life for healthy relationships, not books and laws alone, change our environmentally destructive addictions into socially responsible living. The truth is that all educators, psychologists and leaders worth their name must help the rest of us regenerate earth kinship, otherwise they're part of the problem.

Wouldn't it be spectacular if modern life pervasively sparked a healthy planet and peace because people already felt strongly about their earth kinship and acted off their feelings?

LEARNING OBJECTIVES SEEK TO BRING ABOUT CHANGE IN ONE OR MORE OF THE THREE DOMAINS: PSYCHOMOTOR, COGNITIVE AND AFFECTIVE. UNDERSTANDING OF FACTS, CONCEPTS AND STORING INFORMATION ARE NOT SUFFICIENT TO BRING ABOUT CHANGES IN THE ENVIRONMENT.

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Educators in general at all levels of education have assumed that their role is to transmit knowledge to students usually by an explanatory approach to learning. Although pedagogical approaches may differ, models of teaching used by educators center on developing one of the three domains separate from the others: these domains, being psychomotor, cognitive and affective. It has been assumed that by focusing on each category separately that it was sufficient to bring about behavioral changes in a global sense.

Our premise is that to bring about changes in the behavior and attitudes which influence an individual's concept of the environment, it is necessary to create an educational surrounding in which all three domains are interrelated and in which the classification of values (in a non-technical sense) is an integral part of the educational process. Our research project is to refine a teaching model in conformity with our premise and analyze the effects when applied in the classroom at the elementary school level.

The term which we use to describe this model is "interdisciplinary pedagogical approach" to learning. The approach is applied in projects and the method used is problem-solving. There are five major phases in solving a global problem or attaining a defined goal: the first phase is a period during which the pupils and the teacher clarify the goal to attain or problem to solve. The key question which must be answered during this phase by all the students is "What do we want to do and why?"

The second phase consists of elaborating a plan to attain the goal or to solve the problem. Again during this phase the class uses brainstorming techniques to elaborate their plan of action. The students must decide what tasks must be done to attain the goal, estimate the approximate time it will take to accomplish the tasks, set the date due for each task and who will be responsible to accomplish the tasks.

The role of the teacher during the first two phases is to help the students clarify what is important to them, why it is important, make suggestions and guide them in their planning. The teacher may assign students to certain tasks depending on the grade level, situation and maturity of the students.

No action is taken to attain the goal or solve the problem until these two phases are completed and the students know exactly what they must do and how. Between these phases and the third the teacher must foresee the learning activities which the students will need to work on in order to accomplish their tasks. These activities are called "how to" activities and will be discussed later.

The third phase consists of executing the plan. Before performing their tasks they are required to submit a plan on how it will be done. A plan on any tasks must always be submitted to the teacher before action is taken. This phase may take several weeks or months.

The fourth phase is the reaching of the goal or arriving at the solution to the problem. The fifth phase consists in evaluating the project and an analysis of the results. Usually a new project emerges at this point in time.

There are several characteristics which describe this model:

1) It is an eclectic model taking into account the criticism made by different authors concerning value clarification models. Values are not presented or inculcated directly through moral education activities, but rather they are discussed when the occasion arises during the tasks or activities.

2) It is a flexible and dynamic model avoiding the pitfalls of dogmatism of a particular system. The phases may be done in different ways. The teacher can be more or less directive, a problem may be solved or a goal attained in different ways.

3) There is no specific time allowed for a specific activity on a particular discipline. The students plan with the teacher the schedule for the week or month, taking into account the various constraints of lessons by specialists.

4) All the tasks are learning activities and complementary to each other in the sense that they are related and interdependent.

5) The projects are managed in collaboration between the students and the teacher.

6) Learning objectives are determined by the tasks rather than being predetermined.

7) The model is based on problem solving strategies.

8) All tasks and activities converge towards attaining the goal or solving the problem.

Tasks and activities are defined relative to a given project. We have identified several different types of activities and as the students work on projects, the teacher helps them become aware of the role of each of these.

The first type of activity is for group class which serves to: a) clarify the goal or problem, or b) evaluate the project or c) plan the project or d) receive information.

A second type is the "how-to activity" which is constructed by the teacher to help the students learn concepts or intellectual skills needed to perform given tasks. Although "how-to activities" are foreseen by the teacher they emerge from the given tasks to be accomplished. For instance, if a certain task is to communicate a large quantity of data, a "how-to activity" might be how to use graphs to classify the data in order to communicate them to others. This type of activity covers the learning objectives of any particular curriculum.

A third type is the "consolidation or practice activity" which is also constructed by the teacher and serves to develop technical skills (reading, writing, reading graphs of different types, arithmetic tables, etc.). This type of activity is directly related to the "how-to activity". After the students have understood a particular concept or developed a particular intellectual skill, they need to do practice exercises related to the concept or skill. This practice which is done over a period of several days enables the students to become efficient and proficient so that in future projects they do not have to relearn a particular concept or skill.

Still another type is the "special interest activity" which is related to the project but is not necessary for attaining the group goal or solving of a problem. This type is defined spontaneously by individual pupils who wish to pursue a particular interest such as explore in depth mathematical concepts of probability or do a research project on a particular animal.

Another type is the "how to be" activity which focuses on ways to interact between individuals, clarification of values, behavior problems, as well as all aspects related to behavior difficulties of the pupils. This activity is not planned in advance. It arises as the project progresses.

The "retrospection activities" are those activities in which the students with the teacher analyze the content and methods used to accomplish particular tasks or activities. During these activities, which are usually very short, the teacher helps the students become aware of the purpose of tasks or activities and they become conscious of the strategies they use in accomplishing tasks or solving problems.

Evaluation of learning objectives for a particular grade level is done by students when they have finished a series of "how-to" or "consolidation activities". Evaluation is done by the students themselves in collaboration with the teacher. No collective exams are given. Students choose to take a test when they and the teacher feel they are ready.

Pre-experimentation results with a few classes at the elementary school level indicate that the students and teacher develop positive attitudes concerning themselves, the school and the environment and that they become more sensitive to environmental problems. In addition, the problem-solving skills of the students seem superior to those children who are taught in a regular classroom environment.

There are many questions which we are investigating in applying this model in classrooms. My colleagues and I are attempting in a modest way to help children and teacher change their attitudes and behavior in regard to environmental problems. Our major hypothesis is that to bring about changes in attitude and behavior a teaching model which is eclectic, incorporates problem solving strategies, and the clarification of values will serve to attain these changes.

NOTE: Additional information is available from the author.

STATUS REPORT: ENVIRONMENTAL EDUCATION IN ELEMENTARY AND SECONDARY SCHOOLS

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The practical problem of finding ways to incorporate environmental considerations within K-12 school curricula is a continuing one. Because environmental topics have not traditionally had a curricular home of their own, individuals wishing to include such topics, or to promote their inclusion, have been faced with the necessity of identifying appropriate niches. Doing so presents the same challenges for those interested in environment as a part of school curricula as it does for others promoting the inclusion of other non-traditional topics.

During 1987, the ERIC Clearinghouse for Science, Mathematics, and Environmental Education (ERIC/SMEAC) conducted a survey of the state education agencies, asking respondents to summarize their perceptions as to how schools include environmental topics in their curricula by responding to a series of questions developed to elicit such information. Also requested was information concerning extent of inclusion, forms of environmental education commonly employed, and agency policy with respect to inclusion. The rationale for using this strategy to seek this information is based on the Constitutional responsibility of the states for management and leadership in formal education.

Format of the Survey

Responses were received from representatives of 40 of the 50 state education agencies (80%). Parallel sets of questions were directed toward practice in environmental education and/or environmental topics in elementary schools and in secondary schools. An additional question dealt with agency policy with respect to inclusion of environmental topics.

One question asked, "To what extent is environmental education included in the curricula of elementary schools in your state?" A response was requested in terms of percentages of schools including environmental education in some manner, with five listed response categories: 0-20%, 21-40%, 41-80%, and 81-100%. Of the 38 responses to this question, 17 (44.7%) indicated the highest percentages, while the others were distributed more or less evenly across the remainder of the spectrum of possible responses. Of them, six (15.8%) indicated the lowest frequencies. Nine respondents (22.5%) indicated that their responses were based on data, while the remainder either indicated use of estimates or did not respond to the question. Those indicating data based responses frequently cited state-level requirements for inclusion of environmental topics as evidence that they were in fact included, and did not cite direct evidence of actual inclusion.

Only one state (2.5%) reported that environmental education was most commonly considered a separate subject in elementary schools. Infusion of environmental topics into other curricular areas was noted as a common practice in 39 of the 40 responding states (97.5%); four of those states also indicated that environment was treated as a separate subject on occasion. Thus, in five states (12.5%) environmental education was treated as a separate subject frequently enough to warrant mention by respondents to this survey.

Another question was concerned with forms of environmental education commonly employed in elementary schools. Nature study was cited by 33 of 39 respondents (94.6%). Energy education (by 69.2%), outdoor education (by 66.7%), and conservation education (by 66.7%) also were frequently noted. Relatively fewer respondents noted emphasis on marine/aquatic education (41.)%), while emphasis on either science/society/technology/environment education (20.5%) or on population education (17.9%) was still less common.

Secondary Schools

Another question asked, "To what extent is environmental education included in the curricula of secondary schools in your state?" A response was requested in terms of percentages of schools including environmental education in some manner, with five listed response categories: 0-20%, 21-40%, 41-60%, 61-80%, and 81-100%. Of the 38 responses to this question, 12 (31.6%) indicated the highest percentages, while a total of 19 (50%) noted the two lowest percentages. Only 9 (22.5%) indicated that their responses were based on data; the others either indicated use of estimates or did not respond to the question.

Infusion of environmental topics into other curricular areas was noted as the prevalent mechanism of inclusion in secondary schools by 30 of the 40 respondents (75.0%) to the questionnaire item dealing with format of presentation. Six (15.0%) indicated that both "infusion" and "separate subject" were common in the secondary schools of their state, while 4 (10.0%) indicated that presentation as a separate subject was the more common practice.

Of the 36 who mentioned infusion as a common practice, 28 (77.8%) specified science or biology as at least one of the curricular areas in which environmental topics were infused; of them, 16 (57.1%) indicated only science or biology. Nine of the 36 (25.0%) specified social studies as a subject area into which environmental topics were infused; each of those nine also noted science as a host subject. In two cases (Ohio and Wisconsin), a number of curricular areas were noted as hosts. Alaska studies was identified as a host area in that state's secondary schools, and a science/technology/society curriculum by the Utah respondent. Seven states indicated infusion as the typical practice, but did not identify host subjects.

The two most common forms of environmental education identified in secondary schools were energy education (by 31 of 39 respondents, or 79.5%) and science/society/technology/environment education (by 30 respondents, or 76.9%). Conservation education was noted by 21 respondents (53.8%), and marine/aquatic education by 20 (51.3%). Outdoor education and population education were each noted by 17 respondents (43.6%). Fifteen (38.5%) indicated that nature study was a common emphasis in the secondary schools of their states.

One state (Pennsylvania) requires an environmental course of all high school students, while three others (Indiana, New York, and Washington) mandate the availability, as electives, of environmental courses in secondary schools.

Comparisons Between Elementary and Secondary Schools

In both elementary and secondary schools, reported percentages of inclusion of environmental topics in curricula are bi-modal; that is, in neither situation are the reported percentages clustered in the middle. The reported percentages suggest that environmental education is relatively more common in elementary schools than in secondary schools, with 57.9% of the states reporting elementary schools as being in the 61%-plus category, as compared to 42.1% of the states reporting similar percentages for secondary schools.

The more traditional forms of environmental education--nature study, outdoor education, and conservation education--were more commonly noted for elementary schools than for secondary schools. Nature study leads the rankings in elementary schools, being listed on 84.6% of the response forms, but is at the bottom of the secondary school rankings at 38.5%. Outdoor education shows a similar decline (from 66.7% to 43.6%), though not as dramatic. Conservation education also shows a decrease from elementary to secondary levels, though of a still lesser magnitude (from 66.7% to 53.8%).

Energy education was reported as a commonly employed form of environmental education in elementary schools (69.2%), and even more so in secondary schools, where it achieved the highest level of response of all forms listed (79.5%). When looked at across the K-12 board, energy education appears to be the most commonly employed approach to environmental education in the United States.

Marine/aquatic education was more frequently listed as a common form of environmental education in secondary schools (51.3%) than in elementary schools (41.0%); it appears that proximity to a seacoast or to the Great Lakes is a dominating factor as to whether or not is was listed at either level.

Population education was much more frequently listed as an area of emphasis in secondary schools (43.6%) than in elementary schools (17.9%). However, responses to this survey indicated that the greatest contrast between elementary and secondary schools with respect to commonly employed forms of environmental education is in the science/society/technology/environment area. For elementary schools, S/S/T/E was noted by 20.5% of respondents, while 76.9% listed it as a common form of environmental education in secondary schools. Even though they listed it as a commonly employed form, two respondents suggested that this area is more appropriately referred to as science/technology/society education (S/T/S), the more frequently used term in professional education circles. The S/S/T/E term was used in conducting this survey because of the centrality to and preponderance of environmental topics in most, if not all, published S/T/S rationales and curricula.

State Education Agency Policies

Eight of the 40 respondents (20.0%) indicated "yes" in response to the question, Does your agency have a policy, formal or informal, with respect to the scheduling in either or both elementary and secondary schools? In each case, "infusion" was identified as the required mechanism. Of the 32 who indicated that their states had no stated policy in this regard, 6 (15.0%) specified that environmental topics must be included in school curricula, though manner of inclusion remains a local choice. An additional 10 state (25.0%) recommend inclusion of environmental topics in K-12 curricula; generally, the statements of respondents suggest that infusion is the probable mechanism. The remaining 16 respondents (40.0%) indicated that their states had no policies in this area.

Survey Generalizations

Drawing generalizations from a survey such as the one reported above is chancy, but it is apparent that actual practice with respect to inclusion of environmental topics in the curricula of elementary and secondary schools of the United States is through infusion in more established areas of study. As might be expected, elementary schools which include environmental topics in their curricula operate almost entirely on the infusion model; this probably reflects the organizational patterns of elementary schools in terms of self-contained classrooms and significantly less rigidity in time frames, in comparison to secondary schools. Though there are occasional separate course offerings in environmental topics at secondary levels, their numbers do not suggest any large movement in the direction of "separateness" as opposed to "infusion."

Respondents to this survey have indicated that infusion is generally accomplished in association with science curricula in both elementary and secondary schools, though social studies has been identified as a host content area in several cases, and other curricula in a few.

The reported close association of environmental topics with science curricula may be reflective of a "science bias" (as opposed to a "social studies bias") occasioned by other professional responsibilities of the respondents, many of whom are also science education specialists; that is, a similar survey conducted among social studies specialists representing the state education agencies might reasonably be expected to report more significant relationships between environmental topics and social studies education than has been found through this survey.

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INFLUENCING SCHOOL CURRICULA: CONSIDERATIONS FOR THE NON-FORMAL SECTOR

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It is unfortunate that "traditional" and "modern" environmental advocates do not identify more closely with one another, but it is probably inevitable that they do not. The one group has maintained its pastoral focus for many years; the other sees environmental problems as more precisely, more globally defined. Though their concerns for both humankind and environment are similarly motivated, the personal and professional backgrounds of members of the two groups are different, as are their vocabularies. Thus, they are of different sub-cultures (Disinger, 1986).

For the purposes of this paper, both the traditional and the modern groups are considered environmentalists; educators with similar interests are defined as environmental educators. Though the terms environmentalist and environmental educator are frequently used interchangeably, the roles of individuals purporting to be one or the other are qualitatively different in that the environmental educator's primary responsibility is education--not environmental advocacy (Hug, 1977).

In addition to their common concern for both humankind and environment and a mutual recognition of the intricate inter-relationships between them, both groups recognize the need for "spreading the word." Though schooling is but a subset of education (Brandwein, 1981), it is frequently targeted as an appropriate mechanism by those promoting "education" for special purposes, including environmentalism. In the United States and in much of the rest of the world, schooling is perceived by many special interest groups, including environmentalists, as a made-to-order opportunity to reach large audiences. The logic goes, "All those children are already in the schools--the decision-makers of the future, conveniently assembled for the purposes of learning. What we support (environment, social justice, nuclear disarmament, AIDS education, whatever) is so obviously worth learning that all reasonable people will agree that it should be presented, in an advocacy fashion, in the schools. What we have to do is tell the educators what to teach; they can reasonably be expected to receive our input eagerly. We have ideas as to how it should be taught, which they will also welcome. As a matter of fact, we'll be pleased to teach it for them; they'll be glad to turn their classes over to us, or use the materials which we have generated for that purpose."

Lost in the shuffle?

With so many special interests clamoring for attention to their concerns through the schools, it is inevitable that some will be overlooked; the priorities of a given special interest group are not necessarily shared by the professional education establishment, or by large enough segments of society at large, to secure the support needed to assure its inclusion in school curricula. Also, the perception that "outsiders" know what to teach, how to teach it, and what constitutes appropriate educational materials, is a direct challenge to the professional competence of the professional educator.

Some will say that there is no justification for including any special interest topic, including environment, in school curricula. The stated purposes of schooling in the Western world are many, varied, and not readily prioritized; there is no clear consensus. It may be simplistic to visualize the oft-articulated goals of/for the educational establishment as lying along a spectrum ranging from "institutions for the perpetuation of the dominant culture" to "institutions for the promotion of societal change" (Goodlad, 1979), but this generalization is sufficiently accurate for the purposes of this paper.

Those espousing a traditional view of education frequently contend that learners must master the basics--the 3 R's and beyond--before they are ready to confront real-world problems. When are learners ready to go beyond the basics? This viewpoint may foster a conclusion that this is none of the schools' business; it is not conducive to the inclusion or promotion of in-school environmental education in any sense that environmentalists will support, because they generally perceive real-world, problem-oriented, interdisciplinary treatment of environment as a necessary component of a basic education (Smith, 1987).

The formal education establishment is conservative; it has yet to come to grips with interdisciplinarity, because interdisciplinarity is not congruent with existing school organizational patterns, nor with most teacher education programs. This is a major hurdle which must be cleared, or at least understood, by those wishing to promote the inclusion of environmental topics in classrooms.

A useful way to characterize environmental education, particularly as it is or may be addressed in schools, it to say that it deals with education in the environment and/or about the environment and/or for the environment (Lucas, 1972). Modern-day education often deals with education about the environment, less commonly in the environment, and rarely for the environment. Education about the environment is not in itself sufficient to satisfy either environmentalists or most environmental educators, many of whom prioritize in or for as being of equal or greater importance than about. Likewise, the in component says nothing about what is learned, if anything; it is solely a process, so further specification is needed.

Changing behavior

Environmentalists, traditional and modern, wish to use the formal education system for the ultimate purpose of changing individual and societal behavior with respect to the environment (i.e., education for the environment). Thus, they envision both the potential of and the propriety for schools as change agents within existing society (Disinger, 1982). In their view, formal education is an attractive vehicle for the promotion of environmental quality. Many educators agree with them, but not in sufficient numbers to provide the critical mass needed to effect large-scale implementation.

American society and the professional education establishment both maintain continuing priorities for the traditional curriculum--the 3R's, citizenship education, and beyond--but both recognize other considerations.

As are environmentalists, leaders of both professional education and American society are pragmatists; they work toward what appears to be appropriate, what is functional under existing circumstances. They continue to seek compromise, because that is an accepted approach to decision-making in a democratic society; all sides must be heard, all viewpoints must be considered. If both American society and its formal education establishment had reached agreement that real-world topics such an environment had no place in school curricula, then environmentalists would be shut out, but at least there would be clear signal. Such a tidy outcome has not been realized to date, nor is it likely to be forthcoming; schools reflect the multi-level diversity of perspective which characterizes American society. Thus, opportunity exists for environmental education in the schools, more or less to similar extent and under similar conditions as it does for other "special interest" topics. One special interest receives more attention than another based on the merits of the case it makes for inclusion, but it must make a case.

It appears that one of the greatest shortcomings of the environmental community is that it is so convinced of the righteousness of its cause that it does not recognize the need for rigorous (as opposed to pious, self-righteous) explication, in terms meaningful to both society at large and to professional educators.

A "Second-Order Issue"

Recent studies have shown that the American public maintains a high level of interest in environment, and is particularly concerned about environmental quality (Dunlap, 1987). However, ensuing discussion (McCloskey, 1987) has suggested that environment currently is a "second-order issue;" it attracts scant political attention nationally, being overshadowed by economic and national security issues, but progressively more as local levels are approached. Both environmentalists and environmental educators have long said, "Think globally, but act locally" (Mann and Stapp, 1982; Stokes, 1981); the public generally perceives environmental concerns in local terms.

Similar observations may be made with respect to environmental education. Little priority for it exists anywhere in the federal government, including in the U.S. Department of Education (Disinger, 1986). Some federal agencies support specific aspects of environmental education, but only as those aspects are appropriate to their missions. As might be expected, governmental agencies are likely to target schools as appropriate vehicles for the transmission of their perspectives, primarily because they recognize the opportunity to reach large numbers with relative ease, to influence future voters and leaders. Thus, they behave as advocates of their own missions to a much greater extent than they behave as educators.

A similar situation, with parallel cautions, exists for non-government environmentally concerned organizations, as well as for business and industry. All have environment-related information they wish to disseminate, environment-related perspectives and biases they wish to justify and perpetuate. Their objectives are not likely to be highly congruent with those of the schools, particularly insofar as balance of perspectives is a reasonable expectation and, at least in theory, an absolute requirement of the schools.

At the state level, the picture is mixed. Generally, state education agencies place lower priority on (i.e., devote fewer fiscal and personnel resources to) environmental education now than at anytime since 1970, though a few show remarkable quality and tenacity (Disinger, 1987). In many state education agencies, impetus for the promotion of environmental education can be attributed to a combination of commitment of a few individuals within the agency and support from outside. In several states, resource management or environmental quality agencies devote considerable attention to environment in the schools, primarily in support of their own missions.

In terms of individual school districts, few currently place high priority on environmental education--with notable exceptions (Disinger, 1987). Investigation of activity at the school district level often reveals commitment, initiative, and tenacity on the part of a few individuals who are capable of mustering strong local support, both inside the school and external to it.

Perhaps the most action in school-related environmental education is at the individual teacher level. Though precise data are hard to come by, examples of one or more teachers in a single school building developing and maintaining strong environmental education programs abound. "Commitment" is the bottom-line descriptor for these individuals; they often operate with minimal resources, but are quick to enlist the aid of "outsiders"--agency personnel, representatives of pro-environmental groups, volunteers, etc.--in initiating and maintaining their environmental education activities. It is at this level that the "outside individual" wishing to influence what is taught in the classroom is likely to find his/her most convenient, perhaps only, entree. However, that "outsider" is well advised to remember that he/she is the advocate, not the educator.

The Key is "With"

The professional education establishment has an essential commitment to the traditional basic skills, accompanied by a general but variously expressed commitment to citizenship education; it also has a willingness to consider other topics as appropriate. In general, both state and local education agencies place priority on, and allocate resources for, educational thrusts for which federal funding is available, or for which they see significant support among their constituencies and clienteles. Thus, professional educators interested in environment seek to channel the biases of "outsiders" in such ways that educational materials and opportunities useful in the context of the school setting are accessed. Conversely, it is necessary for environmental advocates to be in tune with the needs, circumstances, and biases of the schools as they attempt to influence the curriculum in and/or for the environment.

There are several examples of enlightened involvement by environmental interests in the development, dissemination, and implementation of exemplary materials for use in schools. Among them are American Forest Institute's Project Learning Tree, the Western Association of Fish and Wildlife Agencies' Project WILD, and National Wildlife Federation's CLASS Project, to mention a few of those best known and most popular. In each case, these materials were developed with professional educators, not merely for their take-it-or-leave-it use. The key is with. Generally, professional educators will admit to inadequate personal knowledge of the detail of natural resource and environmental concerns and shallow understandings of the intricate interactions involved; once they make a commitment to environmental education, they know they need help. Cooperative effort is attractive; symbiosis is possible.

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The Role of Paraprofessional in Florida Extension Programs for Low Income Rural Residents as Perceived by Paraprofessionals and their Supervisors

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Introduction

The purpose of this study was to determine if there were differences in perceptions and expectations of paraprofessionals and supervising professionals on how tasks and responsibilities are actually and ideally performed by paraprofessionals in working with low income rural residents in Florida. Role theory provided the basis from which the conceptual framework was developed. The objectives of the study were:

1. To determine if there are differences between the perceptions of Paraprofessionals and their supervising professionals of the actual reactive, proactive and administrative tasks performed by Paraprofessionals; and

2. To determine if there are differences between the expectations of Paraprofessionals and their supervising professionals of the proactive, reactive and administrative tasks the Paraprofessionals ideally should perform.

Methodology

The Florida Extension Service employs a total of 192 Paraprofessionals and 309 professional staff who conduct programs in agriculture, home economics, community resource development, and 4-H youth. These Paraprofessionals and professional staff are employed by the University of Florida A&M University to develop and implement extension programs for clientele in the sixty-seven Florida counties. For purposes of this study, the University of Florida's Expanded Food and Nutrition Education Program and Florida Agricultural and Mechanical University's program areas utilizing Paraprofessionals were selected for inclusion in this study, both of which provide special educational activities in food and nutrition for low-income residents. The programs include the Florida A&M program which employs 21 Paraprofessionals and two agents, and the University of Florida Expanded Food and Nutrition Program which employs 116 Paraprofessionals and 14 professionals. These two programs were selected since both focus on providing special food and nutrition programs for low-income residents and both utilize Paraprofessionals in a similar way. Further, both programs are supported in part by federal funds targeted especially for expanded food and nutrition programs for low-income residents. A total of 137 Paraprofessionals and 16 professionals are employed at the county level for these programs. These Paraprofessionals and supervising agents constituted the sample which was included in the study. In order to determine research methods appropriate to implement the objectives of the study, a review of literature was conducted. From the review, a research model was developed which incorporated three major functions which were identified. (Gardner, 1980) For purposes of this study, these functions were considered roles. A checklist of tasks was developed for each of the three roles which were combined into a questionnaire, using a format adapted from Gardner's study on the role of the staff and program development coordinator in Florida's Community Colleges. Extension agents and Paraprofessionals were asked to respond to questions addressing role expectations (ideal) and role perceptions (actual). Also, they were asked to respond to questions pertaining to personal and organizational characteristics which related to their responses.

The questionnaire was mailed to two groups: 16 supervising agents and 137 Paraprofessionals employed by the Florida Extension Service. Accompanying the instrument were: a cover letter explaining the purpose of the study, and a self-addressed, stamped envelope. Two weeks later, a follow-up letter was sent to all non-respondents along with a second copy of the questionnaire and a return envelope. There was a total of 82 (72.6%) usable responses from 113 Paraprofessionals and 15 (94%) from supervising agents. Twenty-one counties were represented in the returns.

To meet the first and second objective of the study, a Likert-type scale was utilized to determine the importance of ideal role expectations and perceived frequency of actual performance of each role. Number and percent distributions were calculated for each of the 38 tasks. From these data, mean scores were calculated on each role for the two sample groups. To determine differences between the two groups on ideal role expectations and on perceptions of actual performance, the student's t-test was used. Level of significance was set at .05.

Responses to questions pertaining to personal characteristics revealed that Paraprofessionals and supervising agents were predominantly female (94%) and ranged from 31 to 60 years of age. Sixty-three percent were black; 26 percent white and 8% other. Fifty percent had been employed more than 10 years and the remaining 50% one to nine years.

Approximately 90 percent of the professionals and Paraprofessionals reported being satisfied with Paraprofessionals' knowledge of the position, with the skills they needed to perform their job, and with their personal qualities related to the position. Slightly over 80 percent of the Paraprofessionals and professionals reported that Paraprofessionals were very important in bringing about changes or improvements in the County Extension Program.

Conclusions & Discussion

The findings in this study revealed that there were differences between the perceptions of Paraprofessionals and supervising professionals on the majority of actual tasks being performed by the Paraprofessionals. This was substantiated by the low number of tasks that were significant at the .05 level. The data revealed no differences between the two groups on 9 of 11 reactive, 6 of the 10 proactive, and 14 of the 17 administrative tasks. It can therefore be concluded that there is considerable consensus between perceptions of supervising professionals and Paraprofessionals on the actual tasks being performed by Paraprofessionals. However, in those instances where differences were found in perceptions between supervising professionals and Paraprofessionals on how tasks are performed by Paraprofessionals, conflict or at least confusion, in performance of the role exists. This finding supports the research (Owens, 1981) that found when two persons are unable to establish a satisfactory, complimentary, or reciprocal role relationship, confusion over role perception is commonly observed. For the tasks on which differences were found, the Paraprofessionals reported they performed reactive and administrative tasks more frequently than was reported by professionals. Also, Paraprofessionals reported performing proactive tasks less frequently than was reported by the professionals. Even though the number of differences was small for each of the task areas, these observations suggest the possibility that differences may exist in perceptions concerning the nature of the tasks being performed rather than on the specific task themselves. Also, preventions of the importance of these tasks may vary, as could perceptions regarding the contributions of these tasks to effective program operations. Administrative and reactive tasks could be perceived by Paraprofessionals as relatively passive contributions to the overall extension program, whereas proactive tasks could be perceived as more active contributions. If Paraprofessionals perceive their contributions as being more passive, and/or less important than what the perceptions of the professional would suggest, then there is the likelihood that some misunderstanding and confusion would exist about the actual role behavior of Paraprofessionals.

Further data revealed that there were no differences between Paraprofessionals' and supervising professionals' expectations of how Paraprofessionals should ideally perform the majority of tasks. This is substantiated by the low number of tasks that were significant at the .05 level. The data revealed no differences between the two groups on 9 of 11 reactive, 8 of the 10 proactive, and seven administrative tasks. These differences in expectations of how these tasks should ideally be performed by Paraprofessionals reveal that there is at least some conflict or confusion between the two groups on the tasks that should ideally be performed. This finding supports research by Stogdill (1956) and Owens (1981) which found that differences in role expectations by persons holding similar positions creates role conflict. Also, the data revealed only one task being reported by Paraprofessionals as less important for ideal performance than did the professionals. This task was "consult with agents on activities". This suggests that there may be misunderstandings, confusion or conflict about Paraprofessionals working under the guidance of supervising professionals. For all the remaining tasks on which differences were found, the Paraprofessionals reported each as being more important for ideal performance than did the professionals. This observation, coupled with the observation that Paraprofessionals identified a large number of administrative tasks as being ideally more important, suggests that Paraprofessionals may perceive administrative responsibilities as being more important than they do program related proactive and reactive tasks. Conversely, this could mean that professional staff perceive administrative responsibilities as being relatively less important for Paraprofessionals than they do program related proactive and reactive tasks. Even though there is considerable consensus about ideal performance of tasks, these observations suggest that there may be differences concerning the nature of the contribution that Paraprofessionals should ideally make to the overall extension programming effort.

Finally, the data showed the largest number of differences in task perceptions between Paraprofessionals and their supervising professionals was in the area of ideal administrative tasks.

Differences in perceptions were found on 7 of the 17 ideal administrative tasks, and in all cases, Paraprofessionals considered the performance of these tasks as more important than did their supervising professionals. In contrast, differences were found on only two of the ideal reactive tasks and on two of the ideal proactive tasks. These data support the conclusion that there is conflict, or confusion about the Paraprofessionals' role in performing various administrative tasks. Differences in the perceptions of importance of administrative tasks may be due to inadequate job training by the supervising agent, lack of understanding by the Paraprofessional of their role in performance of the administrative tasks, lack of understanding by the Paraprofessional of their role in performance of the administrative tasks, lack of adequate job supervision of the Paraprofessional by the supervising agent or lack of awareness by the supervising agent that Paraprofessionals' expectations are different from theirs with reference to the administrative task being performed.

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NOTE: A listing of related materials is available from the author.

SKW-UNE-WAS: SALISH CULTURAL IMMERSION

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Imagine stepping into a house that belongs to a different time and a different culture. Imagine, that instead of watching professional interpreters and actors re-enact what the daily life of that culture would be like, it is you who must live and survive in that culture. Imagine that you have entered Skw-une-was: Cultural Immersion Program at North Vancouver Outdoor School.

At the heart of this program is the Coast Salish Longhouse, or more correctly Bighouse, built through the cooperation of multiple agencies. This house sits on a contextually accurate river bank site and is the focus of a fledgling native culture program. With the assistance of band members and museum professionals, we have developed a program to teach the historic practices of Coastal Salish people. The visitors/program participants re-enact native society using recreated artifacts and the living situations of 150 years ago. This is a way of discovering how the land was used pre-historically and historically. The program provides an awareness that demonstrates how our lives in that culture directly influenced the natural world. It allows visitors to live a culture through another set of senses which were not theirs before the experience. It allows visitors to live a culture through another set of values which are intrinsic to the activities they engage in:

- To share
- To show respect to elders and the surrounding world
- To be disciplined in your activity
- To be aware of the seasonality of this world

The intended use of the Bighouse was always to educate but it has become much more than that, it promotes a comprehension of another culture and its roots in a distant time. This comprehension is developed through experience, not lecture; through doing, not displaying. This program creates an "attitudinal glue" which makes interpretive information more meaningful, linking our own new perceptions with a segment of our present community.

Something unique, I believe, about human nature is that we often know what is important before we know the questions which will help us understand it. Unfortunately, major world situations such as extinctions and cultural destruction are like that too. We know there is something amiss but we just don't have the questions that will lead to our discovery, understanding and conservation. In environmental education, we are often presented with topics to teach and no method or means to teach them.

The development of Skw-une-was is a success story, a story where the right questions were generated fast enough to lead us in creating a unique visitor experience; more importantly, a visitor experience with a strong purpose which includes enjoyment and fascination.

West Coast cultures are not simply historic events applicable to textbooks, they are interwoven into our community. Salish influences persist in North Vancouver. This culture did not include tepees, buffalo, horses and railways as depicted in Western movies; it was a culture of bighouses, salmon and cedar, canoes and sailing ships. For us in North Vancouver, the reality was that by-and-large, as most things in school are taught, the line of least resistance - the textbook, would probably be used to teach this culture.

For us, the situation was that the provincial curriculum prescribed that 10 - 11 year-old students should learn about native peoples of North America --a problem. We had a prescribed curriculum - a purpose; we had 4,000 grade 4 students who were asked to learn about it - our population; we had a culture which was alive and poorly understood - our challenge. Skw-une-was became our answer to that challenge.

In 1982, construction began on a bighouse designed by a Salish artisan, Rick Harry, from stories told to him by his elders. The structure was built from cedar logs taken from our property, milled by Corrections Branch and constructed through work programs sponsored by Indian Affairs. As in ancient times, the raising of the house became a community event, an event documented and part of the grade 4 Prentice-Hall social studies text, Native People and Explorers of Canada. The house is the only shed-roof Salish house that I know. It was also built as a living house, not as the ceremonial longhouse as recent houses have become.

In 1984, research based on Royal B.C. Museum photographs and Paul Kane drawings, was used by the author and Carl Halvorson to design and construct the inside of the Bighouse.

As this point, a curriculum team was struck. This team included: Judith McPhie, district cultural liaison officer, and six teachers, Anne Sanderson, Anne Copp, Cathy Harrisum, Carol Roitberg, Louise Steele, curriculum consultant, and Victor Elderton. Other support for this group came from Dr. Leo Marshall, District Superintendent, Dr. Robin Brayne and Mr. Pat Bell, Assistant Superintendents, Don Robertson, North Vancouver Outdoor School Director and Mr. Chris Kelly, Principal.

An informational seminar was held at the Museum of Anthropology, U.B.C., with Dr. Kew to begin the planning process. Crucial to the development of the program at this time was involvement of Squamish Band members. A preliminary sharing workshop was set up by Judith McPhie which included as many Squamish elders and band members as possible, as well as key personnel from the Royal B.C. Museum such as Grant Keddy and Hilary Stewart, a well-known West Coast researcher and author. It was this unique workshop which provided the cultural objectives that the curriculum would examine. For the Salish, keys to their societal structure lay in four basic understandings:

1. To share or co-operate with each other;
2. To show respect to elders and the natural world;
3. To have discipline in each activity;
4. To have a seasonal awareness.

From this point, the curriculum team assembled an immersion curriculum for students which would reinforce the tenets of Salish culture. Each activity represented aspects of Salish life, a daily pattern affected by the seasons.

The life in the house would represent the five specialized groups which made up an extended Salish family, a family, by co-incidence, which could have been as large as a classroom of children. These groups would each have their own fire, sleeping platforms and talents. These talents would be theirs to share with the rest of the house,. The family groups would be:

1. The weaver people
2. The cedar bark people
3. The plant gathering people
4. The salmon people
5. The carving people

Each of these family groups would be shown how to do things by an elder, a docent or volunteer, who would live with them. This was a traditional teaching methodology.

The daily pattern of life for each program participant was broken into specialized family skills and general chores. Each family would be responsible for their own cooking and area maintenance. Each family would undertake a set of specialized activities associated only with their family. The weavers would dy and weave on Salish looms, the cedar bark people would plait and twine cedar, the plant gatherers would collect raw plant materials, the salmon fishers would build and maintain fish weirs and the carvers would carve bowls and spoons. All jobs done in the house would be undertaken using traditionally inspired tools and techniques.

Before visitors became involved with Skw-une-was, a final assessment and approval of the curriculum was given by the Squamish Band. Members of the Squamish Band have now become the senior cultural guides on this educational journey. Ann Billy and her staff of cultural consultants co-ordinate the daily life as traditional elders would have done. This is an important link with both modern and traditional native customs. All ceremonial aspects of Skw-une-was are orchestrated by these program facilitators.

Most museum-like programs like SKW-UNE-WAS stem from an idea, not necessarily a need. SKW-UNE-WAS was developed from a need and is different from typical animated programs where an idea inspires a curriculum. This program started from an identified need and effective facilities and curriculum development was applied to that need.

Now in its second season of operation, the program is completely booked (50,000 visitor hours per season) and methods of expanding access are being sought. Skw-une-was was awarded a national curriculum award for innovative education in 1987. The facility itself is now being used for programming outside of Skw-une-was, such as native language training. The Bighouse and Skw-une-was have become attractions in their own right as has happened at the prehistoric participatory research site in Lejre, Denmark. Both are examples of a growing trend in participatory centres that are becoming holistic or multi-sensory in their approach.

PARTNERSHIPS IN EDUCATION

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Through a collaborative program between the Chicago Public School and the Chicago Botanic Garden, children have not only learned about food webs, natural cycles and interrelationships but also about cultural factors as they relate to the plant world. This participatory learning program is directed to 3rd grade students in 3 different ethnic, low income areas of Chicago and is an integral part of the school science curriculum. As part of the hands-on portion, each school plants, maintains and harvests their own vegetable garden plot. This latter aspect of the program has revealed some hidden benefits in cross-cultural understanding, plant selection and program direction.

History of Program

In 1972, the Chicago Botanic Garden began operating a summer vegetable garden program for Chicago area children of low income families. Since the participating day care center groups could not begin coming to the Garden until mid-May, any in-depth preparatory work was precluded. There developed a growing desire to make the program part of a larger, substantial learning situation with adequate pre and post activity materials within a structured learning situation.

In 1987, a grant proposal was written and funding received through the Joyce Foundation for the Chicago Collaborative Out Reach Education (CORE) program. CORE is an outreach education program coordinated by the Chicago Botanic Garden education staff with 3rd grade teachers and students within the Chicago Public Schools. This multidisciplinary approach to environmental education centers on plant science and involves a total of 16 elementary schools in Districts 14, 3 and 8 in the inner-city. A total of approximately 30 teachers and 960 students are impacted on an annual basis.

During the pilot phase of CORE (Jan. 1987 - Aug. 1988) and continuing through the present, the program coordinator visits the participating Chicago Public Schools on a monthly basis from September through April. May through August the students are bussed to the Chicago Botanic Garden on a weekly basis to work in their vegetable garden. Each school has their own garden plot which they plant, weed, cultivate and harvest weekly. All harvested produce is taken home by the participating students. The learning experience is comprised of a complete study of plants, from seed to table, and provides the optimum in "hands-on" methodology. This dramatic use of a garden resource makes it easier for twentieth century inner-city children to comprehend the reality of man's dependence on the plant world for food and oxygen and to understand those concepts as developed by the classroom curriculum.

A firm foundation had been laid by the 2 year pilot program and in August of 1988 the Chicago Botanic Garden and the Chicago Public Schools were anxious to take the program the next step by incorporating what had been learned in the cultural context while involving teachers in the program's perpetuation.

To this end, another grant proposal was written and funding received from Kraft, Inc. to enable CORE to proceed through Phase II.

Program Design with Unexpected Results: Environmental Education and Cultural Awareness

The stated objectives of the Pilot Phase of CORE were:

- to utilize the unique resources of the Garden in the study of plant science to enhance the quality of education in the urban community.
- to impact the educational needs of the Chicago Public Schools by developing science materials and learning experiences that are integrated with the CORE curriculum and competencies of the third grade level.
- to correlate the plant science program with other subject areas to achieve a multidisciplinary approach that has a greater total educational value.
- to provide teachers with new strategies, activities and enrichment materials that will enhance and upgrade the quality of their teaching.

With implementation in 1987, what was discovered was that the program achieved its anticipated objectives but much more was being learned and experienced. As students and teachers began working with plants and in their gardens, they became inquisitive about insects, food chains, decomposition and natural cycles. As students began planting and eating vegetables unfamiliar to their black, Hispanic, oriental or white culture, they wondered how the plants were used, prepared and eaten by different peoples. Recommendations on new vegetables to plant more familiar to each cultural group began to surface.

Parents, particularly in the Hispanic communities, were anxious to accompany their children to the Garden in the summer months to learn more themselves. They asked many of the same questions as their children and were interested in obtaining information on starting gardens of their own. Environmental awareness was heightening.

Teachers discovered unexpected benefits. Student attendance by 3rd graders at the school servicing the "roughest" of the urban housing projects in the city, Cabrini-Green, was higher on days the students were participating in the program. Teachers and students were learning together and providing bridges to increased understanding.

The 57 Chicago Botanic Garden volunteers working in the program May through August were having their eyes opened to new approaches, appreciations, cultural differences and "samenesses." They responded by listening to suggestions made by teachers and students on plant choices, recipe swaps and increased insect study. This fall they will be accompanying the coordinator on visits to the schools to learn more about the students before they come!

What effect has this had on the program design for Phase II? The instructional curriculum has been modified and increased to include nutrition, soil composition and testing, plant/animal interdependency, food chains, insect exploration and the relationship between the environment and plant growth. Issues to be addressed will include man's impact on the environment and the need for conservation and stewardship because of this interdependency. Every attempt will be made to relate content to the urban setting and to introduce teachers to the opportunities present in using school site activities to teach about the environment.

In answer to the teacher and parent/community response, three new partnerships are being developed in Phase II through the collaboration of the Chicago Botanic Garden and the Chicago Public Schools.

Partnerships in Education

1. Model Garden in the City

Because of the overwhelming positive response of schools and parents on the west side of the city (District 8) to the CORE program, a model garden is being developed in this area. The site will be near an elementary school that has indicated a desire to be included in the program and in close proximity to a community of families who have been on a waiting list with the Chicago Botanic Garden Urban Horticulture Community Gardening program. The Urban Horticulture Department is working closely with the CORE Coordinator, the westside community and teachers to design, develop and organize the vegetable garden. The garden will serve as a training ground for teachers in Teacher Education (see below) and will be maintained and gardened by the teachers, community gardeners and children through the growing season. It will provide an example of community/school partnership and a resource for environmental science, bringing urban man closer to the environment upon which he is dependent.

2. Teacher Education

Teacher training will be increased in quantity and quality both in response to teacher requests and in a desire to include teachers in CORE's perpetuation and dissemination. Those teachers who participated in the pilot phase will be used to teach and train future CORE participants as well as other 3rd grade teachers wishing to improve their science teaching. For this, teachers will receive 2 hours of lane promotion credit through the Chicago Board of Education. Teachers in the program will be required to present lessons to other 3rd grade teachers at their school and on the district level. This will increase the effectiveness and present a model of museum/urban school partnership for other institutions and districts to follow.

3. Site Beautification

As part of the commitment of a school participating in CORE, a school site gardening, planting or improvement project must be undertaken. To assist in these projects, the Garden offers the assistance of its Plantmobile Program and Community Gardening Organization. Some suggested projects might include tree planting in conjunction with Arbor Day; beautification of the school's interior with hanging baskets started by 3rd graders through the plant propagation lesson; marigolds planted around the school's perimeter started by 3rd graders as part of the grow-light experiments; container gardening as demonstrated at the Chicago Botanic Garden's vegetable garden. The objective here is to evaluate if such projects will have a positive effect on public attitudes within the school and local community toward their environment.

Future Program Direction

The culmination of Phase II will be the publication of a Teacher Guide that will contain 3 sections: 1) a formal evaluation of the program; 2) teacher curriculum materials; 3) a case study of the program written by a participating teacher, principal and district superintendent. The evaluation component will present the most interesting challenge as we propose to test for cognitive growth as well as affective changes in attitude and behavior. The University of Illinois, Champaign-Urbana, through the Department of Educational Psychology, has agreed to assist with this aspect of the Guide.

NOTE: Additional material is available from the author.

INTERPRETIVE DESIGN FOR "CLEARING THE AIR" IN U.S. NATIONAL PARKS

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Background

Sequoia and King's Canyon National Parks lie adjacent to the region that has the second worst air quality in the United States. The hazy mountaintops of the Great Smoky Mountains National Park are bathed in acid fog and ozone. Monuments to our cultural heritage are being eaten away by acid deposition.

In response to the air quality crisis developing in areas that are supposedly Class I protected areas under the Clean Air Act, the Director of the U.S. National Park Service, William Penn Mott, Jr., introduced in 1988 an air quality initiative entitled "Clearing the Air." He thus established systemwide a major interpretive effort that stepped out of the traditional role of natural and cultural history interpretation and into the interpretation of critical resource issues. The emphasis of this program was to be on helping the American public to be well informed so it can support fair, effective action.

Extent of the Problem

The main issues to be addressed in the initiative were acid deposition, ozone and visibility impairment. For each of the issues research within the National Park Service can be cited to demonstrate effects of the problem. Acid deposition, for example, affects monuments to our cultural heritage such as the Washington Monument, Mount Rushmore, and the monuments at Gettysburg National Military Park. Both stone and metal structures show the effects, some in terms of pitting, in oxide formation, and in dezincification of bronze. In the Great Smokies streams show a temporary elevation of acidity after storms. Acid waters can also be found in Isle Royale and Shennandoah National Parks after acid rain events. Research is being conducted in a number of parks to measure the acidity of both wet and dry deposition.

Ozone generated by vehicle exhaust reacting in sunlight is having a major effect on park resources. At elevations above 6000 feet in the Smokies the growth rate of red spruce in the last ten years is one-half the rate before 1960. Other stress symptoms include thin crowns, dead tops and necrosis of needles. On over three-fourths of the days in a given year, ozone levels in the Smokies exceed levels known to damage sensitive plant species. In Sequoia/King's Canyon over one-third of the ponderosa pine show moderate to severe ozone injury.

Ozone also contributes to the third air quality issue -- visibility. More than 90% of the time, scenic vistas are affected by human-caused pollution at all National Park Service monitoring sites. The worst problems with visibility occur in the Smokies and in Shenandoah National Park. Several parks are monitoring visibility over time by photography and by use of transmissometers that make it possible to calculate the distance that can be seen at a given time. Since most visitors to national park sites claim that they come to see the beautiful views, loss of visibility could become a major impediment to park use.

NPS Response

In order to prepare interpreters for the challenge of interpreting these critical resource issues, the National Park Service enlisted the assistance of the faculty and graduate students in the School of Natural Resources at The Ohio State University. The Visitor Services Laboratory at OSU as supported by the U.S. Department of State, Man and the Biosphere Program of the National Park Service, and the University to develop materials and strategies for the initiative.

The stages of the development and implementation process have been diverse and responsibility has been broadly assigned. Project coordination came from the NPS Washington Office through Dr. William Gregg, who served as an interface with the NPS field personnel and an advisory committee. The advisory committee consisted of administrators from a few key park units, Washington office leaders, and invited researchers and educators in the field of air quality. This committee reviewed all drafts of materials for accuracy, objectivity, and utility.

The NPS Air Quality Division in Denver served as the source of much of the information about the air quality in specific parks and assisted in identification and application of outside research for park needs. The Divisions's review of the content of all materials was critical to assuring the accuracy of the materials. Two park units participated in the development process. In Sequoia/King's Canyon, two interpreters were employed specifically to develop and test materials for a variety of interpretive modes and audiences. They wrote activities, developed trailside signs, slide programs and program inserts, wrote articles for the park newspaper, and evaluated their efforts throughout the summer of 1987. This park was a model for how the initiative could proceed under optimum conditions of implementation.

In the Great Smoky Mountains National Park, two graduate students from OSU spent the summer of 1987 in the park developing similar programs and materials from a perspective of non-NPS staff. To validate their efforts the students worked closely with the interpreters but presented and evaluated most of the programs themselves. A third graduate student worked with the Gatlinburg schools to develop curriculum materials on "Our Backyard Biosphere Reserve," for grades K-8. Many of the instructional units addressed air quality concerns because of their impact on the resources of the Reserve (the Great Smokies).

The draft materials were presented in an instruction and training program for the Chiefs of Interpretation of the National Park Service regions, and with the feedback of that group the final materials were assembled. Products of the program included a captioned slide set from which parks could construct their own slide programs, a set of 29 fact sheets, 24 sample interpretive programs, the Gatlinburg curriculum materials, a directory of over 60 air quality materials from other sources for interpreters and educators, and a slide program with script on "Clearing the Air." The final materials were sent to all National Park Service units for use during 1988 and beyond.

Where from here?

The "Clearing the Air" initiative is a laudable step that the National Park Service has taken toward public understanding of air quality problems. Director Mott has stated, "our research on visibility, ozone, acid deposition and other aspects of air pollution not only is helping to clarify these matters with respect to Parks but is an important contribution to national and international understanding.

The materials developed for this initiative have application beyond the National Parks, of course. At the present time, however, no mechanism has been established for distribution beyond the agency. Contact with park units in local regions is recommended for environmental educators seeking further information on the program and its materials.

BIOLOGY AND CONSERVATION OF SEA TURTLES

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The earliest known fossils of sea turtles date back to over 150 million years. These air-breathing reptiles have no changed dramatically through time and are well adapted to their life in the sea. Seven species are recognized today and are widely distributed through the world's temperate and tropical oceans. The Olive Ridley (Lepidochelys olivacea) and the Australian flatbook turtle (Chelonia depressa) do not inhabit U.S. waters. The Green, Leatherback, Hawksbill, Atlantic or Kemp's Ridley and Loggerhead turtles inhabit our coastal waters. All of these turtles are listed as either threatened or endangered.

The main reason for the sea turtles' decline is pressure placed upon them by man. Nearly every part of the turtle has been utilized: the meat and eggs for food, shells for decorative items, hides for leather products and body oils for cosmetics. The international trade of these products is highly detrimental to these marine turtles and there is an ongoing effort internationally to stop the trade of these endangered species products through CITES--The Convention on International Trade in Endangered Species of Wild Flora and Fauna. In the United States, sea turtles are protected under the Endangered Species Act of 1973 and the agencies charged with enforcing their protection are the National Marine Fisheries Service (turtles in the water) and the U.S. Fish and Wildlife Service (turtles on land). In Florida, the Department of Natural Resources also administers turtle protection programs in cooperation with the federal agencies.

The most highly endangered turtle of all is the Kemp's Ridley (Lepidochelys kempi), also known as the Atlantic Ridley. It is a small turtle, weighing up to 100 pounds and omnivorous. Their nesting was a mystery until the early 1960s, when a group of scientists viewed film footage of approximately 40,000 female ridleys nesting all at the same time during daylight hours! This occurred on a Gulf coast beach near Rancho Nuevo in Mexico. Such a mass nesting is referred to as an "arribada," Spanish for arrival. Scientists are still searching for the key as to why this nesting habit occurs. Today, only about 400 to 600 females nest annually at this location during the spring and early summer.

Another small sea turtle is the Hawksbill (Eretmochelys imbricata). The largest hawksbill on record weighed 280 pounds. Its name comes from the hawk-like beak and its carapace is highly prized for tortoiseshell jewelry and other decorative items. The diet of the hawksbill consists of invertebrates such as sponges, crabs and lobsters and vegetation. Only four hawksbill nests have been documented in Florida over the last fifty years.

The Green sea turtle (Chelonia mydas), a vegetarian, gets its name from the color of its body fat. Adults weigh an average of 350 pounds and nest in small numbers on Florida's east coast. Green sea turtles have been hunted for food and leather products. In Florida, greens are the focus of the Headstart Program, where some hatchling green sea turtles are maintained in captivity for nearly a year and then released. By releasing these turtles at a larger size, hopefully they will be less likely to fall prey to other marine life.

The giant of the sea turtles is the Leatherback (Dermochelys coriacea), which has been known to weigh up to 1500 pounds. Its carapace differs from other sea turtles--it lacks scutes and instead if made up of an oily, cartilanenous material with seven prominent ridges down the length of the back. The main component of the leatherback's diet is jellyfish, but other soft-bodies animals are eaten. It is also the only reptile species known to be active in water temperatures below 50 degrees fahrenheit. A few leatherbacks nest on Florida's beaches.

The fifth species found in Florida is the threatened Loggerhead (Caretta caretta). A full grown loggerhead weighs 200 to 300 pounds and is easily recognized by the "garden" of algae and barnacles growing on its reddish-brown shell. This turtle is omnivorous and the Southeastern U.S. is a critical breeding area for this species. Most of the nesting of this species occurs in Florida from Broward County north to the Canaveral area. Some 10-12,000 nests are laid in this region each summer.

During the summer months, sea turtles use Florida beaches extensively for their nesting. Coastal development has impacted their populations and nesting in many areas. Nests are lost to high tides, beach erosion, turtle poachers and animal predators such as raccoons and ghost crabs. Hatchlings are preyed upon by a wide variety of predators, both on the land and in the ocean. Artificial lighting can also be a problem, disorienting sea turtles and causing them to end up in parking lots and roadways. Another problem is vehicular traffic (off-road vehicles) on some beaches during the summer.

Sea turtles have also been entangled in fishing gear, especially by nets used by shrimp trawlers. With recent legislation requiring the use of Trawler Efficiency Devices or TEDS in certain areas during certain dates, the numbers of turtles dying in this fashion appear to be on the decline. Plastics and other non-biodegradable materials also pose a threat to sea turtles, as turtles are known to ingest these foreign materials and end up dying from starvation after the digestive system becomes blocked. Sea turtles also suffer from injuries and death due to collisions with boats.

The conservation of sea turtles is no easy task. Federal, state and local agencies, along with private industry, civic and conservation organizations are working to improve and insure their survival. Research continues on these species to find solutions to many unanswered questions about their biology and habits. Education efforts geared toward the general public are intense in Florida where thousands of people participate in state and federally permitted "sea turtle walks." These walks not only interpret sea turtle ecology to the lay person, but also allow the public to witness the egg-laying process without harassing or interfering with the turtles. Law enforcement efforts are geared towards catching poachers of sea turtles and their eggs and eliminating trade of their parts and products in the U.S. Other governmental agencies are working towards protecting the coastal environment and keeping already stressed nesting sites safe from further harm. All these efforts will aid in preventing the extinction of these ancient reptiles, masters of life in the sea.

DEVELOPING EFFECTIVE WILDLIFE EDUCATION PROGRAMS: A MARKETING APPROACH

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Saving Florida's unique wildlife heritage concerns us all, and effectively designed wildlife education programs are the key to wildlife conservation in Florida.

The Florida Game and Fresh Water Fish Commission's Nongame Wildlife Program (NGWP) is charged with conserving the 85% of Florida's wildlife classified as nongame. Since 1985, the NGWP has been gathering information in order to fulfill the enormous task of educating Floridians. We developed a stepwise process which incorporates principals of education, biology, sociology and marketing and is very similar to the process employed by marketers when designing a marketing plan.

In 1985 the NGWP conducted its first public opinion poll. Next, over 200 research papers reporting how people relate to wildlife and examining Florida demographic trends were analyzed and synthesized to produce the NGWP technical report entitled, "Floridans and Wildlife: Sociological Implications for Wildlife Conservation in Florida" (Duda, 1987 a).

In 1987, Montgomery Research Consultants were hired to further analyze Floridian's attitudes, perceptions, interests, knowledge and actions and guide us in determining our educational priorities. Montgomery surveyed 1699 randomly selected Floridians and included a unique qualitative research technique called focus groups. (A focus group is a small homogenous group of people brought together to gather in-depth information regarding the group's attitude and perceptions. This technique is often used in marketing research.)

Concurrently, NGWP staff determined our greatest habitat priorities and Millsap et al. (1988) developed a comprehensive ranking system of Florida's nongame wildlife.

The Nongame Wildlife Program has used the above information to form the first year of a five year wildlife conservation education plan (Duda, et al. 1988). From this research we identified nine target audiences and identified specific messages and programs for the individual target groups. Actions each group should take and appropriate communication strategies were also identified. Although this approach is not new to the corporate business world, many nonprofit organizations, and particularly governmental agencies, have generally not shown any awareness of interest in marketing (Kotler 1982).

What Is an "Effective" Wildlife Education Program?

What is an "effective" wildlife education program and what does marketing have to do with it? What are the best audiences for our limited education dollars? Which species or issues should we focus on? Which messages should we communicate and how? How should success be measured? These questions haunt wildlife educators in search of the strategy which delivers "the biggest bang for our bucks".

What Are Your Priorities?

An effective wildlife education program must be focused and proactive. What are the top issues, species or habitats? How should they be ranked? These questions must be answered beginning with a listing and ranking of all the possible issues and problems.

What Are Your Goals and Objectives?

Once problems, issues and concerns are defined, measurable objectives must be set. Historically, agency wildlife information and education efforts have taken an unfocused "shotgun" approach often responding to brushfire type issues. Effective wildlife education programs should do more than merely create awareness and should be closely linked to the habitat or species management plan. Measurable objectives are quantifiable and usually specify a timeframe.

Who Is Your Specific Audience?

Since Florida's wildlife is facing a multitude of immediate threats, it is no longer acceptable to say "educate Floridians about wildlife". Wildlife educational efforts must target specific groups with specific messages (Duda, 1987).

Why Should Educators Target Specific Groups?

Floridians are a diverse group and the way they relate to wildlife is affected by many factors such as gender, race, knowledge levels, attitudes, income, place of residence, personalities and what type of activities interest them (Duda, 1987). Even though many wildlife professionals recognize these demographic and psychographic differences, they still refer to the "general public" as if there is one homogenous group of Floridans. In fact, the "public" is a large heterogeneous group composed of smaller homogeneous subgroups with similar wildlife information and education needs (Montgomery 1988).

People are also influenced by an internal factor or concept called "locus of control". Locus of control refers to whether or not an individual feels he or she has the ability to bring about change through their own behavior. (Hines, et al., 1986). These authors also found that the following variables were associated with responsible environmental behavior: knowledge of issues, knowledge of action strategies, locus of control, attitudes, verbal commitment and an individual's sense of responsibility.

There also seems to be a strong relationship between the beliefs an individual or group holds and their environmental action level (Wilson 1986).

How Are Target Groups Identified?

Subdividing this population mix into smaller subsets with similar needs and philosophies is called market segmentation. Market segmentation offers

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the following benefits: 1. It allows more precise definition of a particular group's needs. 2. It strengthens the educator's/marketer's ability to meet changing demands in the market. 3. It allows efficient allocation of marketing, communications and education resources, and 4. It makes it possible to set educational objectives more precisely (Montgomery et al 1988).

Public Opinion, Knowledge Levels and Attitudes Are Important in Market Segmentation.

Public opinion is also helpful in establishing a group's profile. Many studies indicate there is strong public support for wildlife conservation (Duda, 1987). From research of Montgomery and others, we know Floridians are fairly aware of our wildlife and environmental issues. Using a conservation education model depicting the process of "awareness to action", we discovered citizens at the concern stage of this model are in many cases ready to act (Duda 1988 b), but may not know what to do or how to do it. Our survey indicates that 82% of Floridians believe they can personally help wildlife and protect the places where they live. But, within the last 2 years, only 9% of Floridians have written a letter to the editor or a politician supporting wildlife and only 10% volunteered time for a conservation cause. Even so, a staggering 54% provided food or shelter for wildlife on their property and 37% donated money. Actions that require relatively low investments or show immediate reinforcement were more likely to be taken. We learned citizens must be taught how to take the actions and actions must be suggested which a particular group is likely to take. Montgomery's research indicated that as a prerequisite to action, Floridians need more information about why the action is needed, and after taking action, be shown their effort made a difference.

In addition to the quantitative survey, Montgomery conducted a series of ten qualitative focus groups. Each focus group represented a different demographic or cultural subgroup.

Knowledge and understanding of a group's attitudinal orientation is fundamental in developing educational programs. Dr. Stephen Kellert of Yale University has done much innovative work describing how humans perceive wildlife and the environment. Kellert (1976), identified the following human attitudes toward animals: humanistic, naturalistic, ecologistic, scientific, aesthetic, moralistic, doministic, utilitarian, and negativistic (fig. 1). These attitude types have implications for the messages and appeals which can be used to educate different target groups (Montgomery, et al. 1988). Montgomery's research and Duda's synthesis of Florida public opinion, demographic trends and attitudes toward wildlife enabled us to select 9 target audiences. Target groups identified for the Commission's Nongame Wildlife Program are: college educated professionals (25-64 years), volunteer oriented women, conservation groups, development professionals, landowners, hunters, educators, seniors and Hispanics.

Marketing means a selection of target markets rather than a quixotic attempt to serve every market and be all things to all humans. Marketers routinely distinguish between possible market segments and decide which ones to serve on the basis of market potential, mission, or some other basis (Kolter, 1982). These marketing techniques have long been used in the business world. Why not employ the same effective, persuasive techniques to develop programs that engage citizens to act on behalf of the environment.

What Is The Message?

Analysis of the target audience reveals the level of knowledge, interest and concern, the group's media preferences, what actions they are taking, and what they are willing to do. Messages fall out once the top issues and management problems are identified. Remember, research shows that Floridians are aware and even concerned about problems facing wildlife, but simply are not acting. Messages must be action oriented and materials must be designed to suit a specific group's attitudinal and educational orientation.

In addition to targeted programs with messages engaging citizen action on behalf of specific issues, Montgomery recommended a broad based mass media campaign. At the center of this campaign is the slogan "What Have You Done for Wildlife Lately?".

Communication Strategies

Obviously with such a dynamic and diverse human population many strategies are required. The most effective strategy depends on the type of group, on the type of change one desires to make and on the group's relative position in the education process.

Kotler (1982) determined the following 4 categories of change in order of increasing difficulty to accomplish:

1. Cognitive Change - The objective of this approach is to create attention, awareness and impart knowledge.

2. Action Change - The objective of this approach is to induce people to take a specific action.

3. Behavioral Change - This approach attempts to induce people to change some aspect of their behavior.

4. Value Change - Beliefs and value modification is the most difficult type of social change to achieve.

Educational materials must be designed and presented in an acceptable and appealing way to the target group, in a medium they are familiar with and frequently use, and at the appropriate educational level (fig. 1).

Based on his research, Montgomery identified four persuasive statements or "appeals" in order to design materials that motivate certain target groups: 1) it is important to save wildlife for the benefit of future generations, 2) it is important to save wildlife to make our lives better and more enjoyable in the present, 3) we have an obligation or moral duty as members of society to act as stewards of this earth and to preserve wildlife for the good of all living things, and 4) wildlife conservation is the "thing to do", and it's fun.

Montgomery recommended one or more of these appeals for each target group.

Agency information and education pieces are often presented as brochures, or one projector slide show, and are designed to "inform" the public. Brochures and slide shows are typically "one-shot" educational efforts and are not necessarily effective in producing a more longterm positive attitude or inducing action. Moreover these tools are often not geared to specific audiences (except for those clearly designed for children or schools) and are generally not linked to a species management or recovery plan.

These traditional approaches usually lack the persuasive and motivational power and audience focus needed to influence and move interested and concerned Floridians from "awareness to action" (fig. 2).

Hence, evaluation as to whether the effort or dollars spent made a positive difference to the conservation or management of the species is usually unknown.

This approach assumes there is an audience called the "general public" and that this public is interested enough to request the plethora of brochures and slide shows produced.

Montgomery revealed that only 6% of Floridians receive their wildlife information from slide shows. A majority or 82% of Floridians sampled receive their wildlife information from weekly T.V. shows or documentaries and another 42% received their information from T.V. PSAs or news shows. Magazines followed television with 42% receiving their wildlife information from nature or wildlife magazines and other 37% reporting they read about wildlife in other types of magazines.

Dissemination

Making the message available to the audience is often difficult. Often materials are produced which sit on shelves because the intended audience does not know they exist. Active dissemination takes a great deal of time and energy and must be considered early in the planning stages. Often the target audience defines the dissemination method. For example, if a "Developers Handbook to Florida Wildlife" is produced, then it could be distributed to developers through advertisements placed in magazines development professionals read, sent through direct mail to all developers in Florida, or distributed through an intermediary such as a local planning council or home builder's association.

Product advertisement is as important to wildlife education as it is to selling soap. But, beware--when you advertise, be prepared to handle the onslaught of requests. Being unprepared to serve the public and manage distribution can generate a flurry of negative effects, ultimately downgrading all those well planned efforts.

Evaluation - Did the Effort Make a Difference?

Program evaluation is an important phase in the conservation education process and is often overlooked. A successful program is measured by how well it fulfills the measurable objectives set in the beginning. An evaluation may be as simple as counting the number of participants or number of materials distributed or as comprehensive as a fieldtest prior to implementation. The ultimate measurement of success for any wildlife conservation education program is if all the money, time and effort invested made a positive difference for wildlife.

Conclusion

Developing "effective" wildlife education programs simply means thoroughly understand your issues, determine what it takes to solve the problems, set measurable objectives and define your audiences. Programs should be directly linked to species of habitat management plans and actions should be those a target group is likely to take. Understand as much as you can about your audience(s). Only then will you know whether the group is at the "awareness" stage or "concern" stage of Henderson's educational model. Communication methods should be chosen based on the target audiences preferred media habits and be designed in an appealing manner to the target audiences.

Designing programs that ultimately result in a citizenry that acts on behalf of wildlife is the key to wildlife conservation and saving those special places our wildlife live.

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FIGURE 2

ATTITUDES TOWARD ANIMALS

NATURALISTIC:	PRIMARY INTEREST AND AFFECTION FOR WILDLIFE AND THE OUTDOORS.
ECOLOGISTIC:	PRIMARY CONCERN FOR THE ENVIRONMENT AS A SYSTEM, FOR INTERRELATIONSHIPS BETWEEN WILDLIFE SPECIES AND NATURAL HABITATS.
HUMANISTIC:	PRIMARY INTEREST AND STRONG AFFECTION FOR INDIVIDUAL ANIMALS, PRINCIPALLY PETS.
MORALISTIC:	PRIMARY CONCERN FOR THE RIGHT AND WRONG TREATMENT OF ANIMALS, WITH STRONG OPPOSITION TO EXPLOITATION OR CRUELTY TOWARDS ANIMALS.
SCIENTISTIC:	PRIMARY INTEREST IN THE PHYSICAL ATTRIBUTES AND BIOLOGICAL FUNCTIONING OF ANIMALS.
AESTHETIC:	PRIMARY INTEREST IN THE ARTISTIC AND SYMBOLIC CHARACTERISTICS OF ANIMALS.
UTILITARIAN:	PRIMARY CONCERN FOR THE PRACTICAL AND MATERIAL VALUE OF ANIMALS OR THE ANIMAL'S HABITAT.
DOMINIONISTIC:	PRIMARY INTEREST IN THE MASTERY AND CONTROL OF ANIMALS TYPICALLY IN SPORTING SITUATION.
***NEGATIVISTIC**	PRIMARY ORIENTATION AN ACTIVE AVOIDANCE OF ANIMALS DUE TO INDIFFERENCE, DISLIKE OR FEAR.

*HYPOTHETICALLY, THE NEGATIVISTIC ATTITUDE CAN BE DIVIDED INTO 2 ATTITUDE TYPES: A NEUTRALISTIC ATTITUDE REFLECTING A PASSIVE AVOIDANCE OF ANIMALS DUE TO INDIFFERENCE; AND, A NEGATIVISTIC ATTITUDE CHARACTERIZED BY DISLIKE AND FEAR OF ANIMALS. IN THIS RESEARCH, ONLY ONE ENCOMPASSING ATTITUDE HAS BEEN CONSIDERED.

Developed by Dr.Stephen R. Kellert of Yale University.

4-H EXPEDITION MANAGEMENT: ADVENTURE-BASED TRAINING FOR TEEN LEADERSHIP DEVELOPMENT

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Introduction

The Florida 4-H Expedition Management Training (EMT) is an experiential learning activity. It is part of a family of activities often termed "challenge" or "adventure education programs", similar to Outward Bound and Project Adventure. Expedition Management Training was conceived as a method for teaching teens leadership after observing that teens either misunderstand the concept of leadership or tended to shy away from leadership roles at a time when society expects them to learn and practice these skills. Unfortunately, many teens are forced to learn leadership skills in environments conducive to failure. In families, schools, church and youth groups, they are asked to develop activities and make decisions without having parameters identified or limits defined. They are usually surrounded by well-meaning adults, who are eager to bail them out when things start to go wrong. Often communication and decision-making skills are poorly developed and training opportunities non-existent. In 4-H the teens are often placed in leadership roles that affect younger children and parents. They become subject to sharp criticism if their decisions aren't perceived by adults as "correct" or if the planned event fails. This is further complicated by the teens excessive concern for appearances, in the presence of their peers, which undermines their self-confidence.

The objective of this program is to enable teens (and adult leaders) to learn, practice, and analyze leadership skills in controlled situations having some risk for failure. Progressive experiences are provided in somewhat stressful unfamiliar environments, (wilderness areas, underwater, etc.) with real and perceived risks. Each expedition has a specific goal, time frame, and END PRODUCT. The end product can be as simple as the development of an accurate map of some environment or as complex as the scientific documentation of observations made on some natural phenomena. Appropriate skills and risk management training are provided prior to the expedition. On expedition, the youth actually lead the trip, making all decisions relevant to the expeditions mission. Adult staff volunteer roles are clearly to serve the teen leaders as resource persons in support of the project, and step in ONLY when a real threat to safety is perceived.

The Florida Expedition Management Training Program is based on a variety of past "Expeditions". These include a week-long backpacking trip on the Appalachian Trail, a three-day crossing of the Okeefenokee Swamp by canoe, and three separate excursions down the Suwannee River. More recently, the "FLORIDA 4-H UNDERWATER EXPEDITION TRAINING PROGRAM" was held at the Sea World Marine Lab Facility in the Florida Keys. The mission of the underwater expedition was to map benthic fish territories on a single coral reef. Of course, other "Expeditions" involving backpacking, canoeing, wetland studies, cave explorations, wildlife observation & photography trips, urban studies, etc. can be planned. The components of the EMT model can be made to fit any "Expedition" having some end result or "product" in mind.

Teen Development & Expedition Management Training

Seven needs have been identified that affect most teenagers (Lefstein, 1988). These are: physical needs, competence in achievement, creative expression, positive social interaction, structured clear limits, meaningful participation, and self definition. In the EMT program strategy, each of these are addressed and coupled with leadership skills which are learned and practiced. There are three major premises on which this EMT program is based:

1. every member of the expedition group has an important contribution and exhibits leadership while contributing;

2. leadership skills are a complex set of interacting skills that can be identified and learned;

3. individuals can function only within a larger environment.

Although in some respects it is different from Outward Bound or Project Adventure, EMT shares some common objectives and methodology of these programs. The objectives of adventure education can be classified into three categories: AFFECTIVE; COGNITIVE; and psychomotor or PHYSICAL skills. In the AFFECTIVE area, the goal is for each student to increase their self-esteem, self-confidence, trust in themself and others, and to develop an appreciation for and identification with their natural environment. In the COGNITIVE area, each student develops specific knowledge and skills to live and function in harmony with their environment and increase their knowledge of group dynamics and social interaction. Finally, in the PHYSICAL area, each student develops an increased level of coordination, agility and awareness of their own and others limitations. Expedition management is a balance of these three areas with a primary emphasis on leadership skills and group dynamics.

Expedition Planning Basics

There are four basic parts to a successful expedition:

1. Setting the stage, recruitment and planning the expedition;
2. training for the expedition;
3. the actual expedition, and
4. the debriefing, conclusion or evaluation of the process and presentation of the end product.

Setting the Stage. Recruit a team of volunteer adults and acquaint them with the philosophy and goals of the expedition management concept. It is important that they perceive their role as creating a positive supportive atmosphere and are conscious of their role for insuring safety. They must understand they are not to make decisions, solve problems, or direct activities, but instead to be mentors and facilitators of the teens' interactions. Adult volunteers should understand they are also TRAINING to be the primary adult facilitator in future expeditions. This type of training involves a large commitment of time and energy, with a high ratio of adults to teens. The more committed and trained adults involved, the more opportunities will be available for teens.

Next, recruit a group of eight to sixteen teens. The number should be based on the type of "Expedition" planned. For example, a backpacking trip could safely accommodate a much larger number of persons than a SCUBA diving expedition. Begin with get acquainted, team building and trust activities. If the adults of youth have not participated previously in trust and team building activities, this prerequisite should be extensive. In Florida, all EMT candidates are required to participate in the "4-H I CAN, WE CAN" program (a weekend challenge program).

Outline the basic expedition management agenda to the group and explain what they will be doing. Establish a GOAL for the expedition, and make sure all understand and agree with it. The parameters of the expedition will be identified at this time. If the group is young and/or inexperienced in group dynamics, the adults may select a specific expedition goal and set very defined parameters. If the group has experienced similar training, the teens may make all the decisions except safety rules and the Basic Expedition Guidelines. The Basic Expedition Guidelines should be stressed from the very beginning of the program and reiterated frequently, and as needed.

Basic Expedition Training Guidelines.

1. Participants (youth & adults) will attempt all group activities.
2. No one will put down themselves or any other participant, even in fun.
3. Participants will practice safety in all situations.
4. During the expedition, adults will intervene only when necessary for safety considerations.
5. All participants participate in DAILY debriefing sessions.
6. Major group decisions such as to go on or terminate the expedition due to weather, etc. are to be CONSENSUS decisions not a majority vote. Note: Deciding to terminate an expedition should never be considered a failure. Failing to terminate an expedition when conditions warrant it, should be considered a failure!!!
7. Every participant (youth and adult) will support the major expedition goal and contribute to the end product.

The training staff, teens and adult volunteers work together to set the expedition goal, time frame, and end product. Examples of end products might be: research for a science project, photographic article for a newspaper or magazine, plant identification or ecological map, historical data, survey information, slide show or video, etc. Further training will depend on the expedition site, need for additional skills, the goal, and end product selected.

Training for the Expedition. The success of any expedition depends on how prepared the participants are. The expedition is not merely a trip from point "A" to point "B". It is a planned event in which a team of people focus on gathering specific information from sometimes less than hospitable environments. If it is from an underwater setting, it will require extensive training in underwater data gathering methods as well as the safe operation of life support technology.

The training should take place in several sessions. Appropriate and specific training should be decided by the youth and adults. First aid training and environmental awareness would be a part of any expedition. Additional topics might include: food preparation and sanitation; clothing selection and care; orienteering; packing a backpack; canoeing; water safety; wildlife identification; photography; map making; etc., depending on the expedition chosen. Teens, adult volunteers, or resource persons could provide the training, sometimes many months in advance of the expedition.

During the subject matter training, plan for experiential training in communication understanding others, working with others, and decision-making. This is equally as important as the subject matter training. One adult should be the facilitator throughout the training to ensure it is a planned part of the training and isn't just left to chance.

During the training phase, expedition leadership roles are identified and discussed. Usually brainstorming techniques followed by discussion of the roles is best, unless the leadership experience of the group is weak or the expedition highly structured. This technique takes more time in the beginning, but will result in a clear understanding by everyone of what each leadership role entails.

During the training, the teaching staff should be evaluating the teens for leadership assignment roles. Expedition leaders of teams are selected either by election or appointment. Depending on the expedition selected, the roles can be rotated during the expedition. Care should be taken, however, if roles are rotated, to ensure there is a consistently clear focus of each teen leader-participant on the original goal of the expedition., Fresh leaders are often eager to create new (personal) goals part-way through the expedition, especially if their understanding of the expeditions goal was unclear, or if they become "bored" with the information gathering methods used. Examples of leadership roles include: expedition leader, safety officer, navigator, scientist, archivist, site selection officer, supply officer, journalist, photographer, and others as needed. It is important that each participant accept responsibilities and recognize that the success or failure of the expedition depends on everyone, not only the assigned leaders.

The Expedition. The third part of this program is the actual expedition. A few trust or team building exercises should be held at the start of the expedition, especially if the training was conducted over a period of several weeks or months. The expedition should be as realistic as possible with the teens planning and conducting as much of the logistics for transportation, food, and equipment as possible. As the expedition proceeds, youth leaders or teams fulfill their roles with the support and assistance of the group.

Debriefings should be scheduled each evening with the youth expedition leader asking first for a report from each youth leader as to what aspects of his responsibility went well. This is followed by like comments from the rest of the group. Adults can make brief comments at this time as long as they are positive in nature and do not contradict or overshadow the teens' observations and decisions. Following these reports and comments, the leaders first, then the group, are asked to suggest improvements for the next day. To get things started the youth expedition leader might begin with: "How did you feel about today's progress?", "Were there times anyone felt frustrated?", "When?". "How did you deal with these feelings?" and "How did the group help each other out?". These suggestions can be discussed as part of the pre-expedition training so the group will expect them.

The daily debriefing is the time to alter plans that aren't working or make adjustments due to the weather, lack of adequate equipment or training. Recognize that on any expedition, strong personalities, cramped conditions, unfavorable weather, unfamiliar food, physical exertion and lack of sleep contribute to stress. The professional staff should help the youth and the adults understand and expect stress to occur and to plan for its management. If necessary, the adults may suggest a debriefing be held by the teen leader during the day to sort out feelings of frustration or aid in decision-making or altering plans. However, these "special" debriefings should be kept to an absolute minimum, for they represent "adult intrusion" into the teen-led activity. Aim, when practical, for a group consensus in the decision-making process.

Final Debriefing & End Product. The final part of the Expedition Management Training program is the conclusion, final debriefing, and display of the end product. This should be held before the group terminates the expedition or no more than a few days later. It is best held as soon as possible after the expedition, so accurate information is retained by the group. Often if pictures need to be developed, videos edited, or a journal typed, a follow-up session is planned in addition to a debriefing at the conclusion of the expedition.

Summary & Conclusions

Adults need to be aware of several aspects of this type of leadership training. It takes more time than most youth events. The discussions, planning, and training are the most important learning activity if the expedition is to be a successful experiential learning situation. During the expedition, because of its mission, it will take longer to get from point "A" to point "B" than one would usually plan for a simple trip. So be sure this is taken into account, especially if the expedition is a canoe trip or backpacking involving an overnight campout.

There should be plenty of time for exploratory activities along the way, such as plant identification, photography, or mapping that will involve group decision-making and learning. When working with commercial outfitters or guides, they will usually want to cover longer distances each day than your "mission" may allow. Be sure to discuss your expeditions goals with the commercial outfitters or guides, so they can "play along" with the teen leadership element of the expedition.

A big advantage of this type training is that teen decisions do not affect younger children. Consequently, the adults do not need to "bail them out" in order to save face. You may have to warn adults to bring along some tape to help cover their own mouths, if they are prone to intrude in the leadership aspect of trips by "taking over". Most adults will initially experience frustration while on expedition, because they are too eager to provide solutions. The learning occurs when the teens discover the solutions, even if they are not exactly the "right" ones that the adults would have provided. It is better to allow some elements of the expedition to "fail", for from failure comes deep understanding and learning. In matters of safety, though, there is no room for failure and any emerging unsafe condition must be curtailed. It will be important to require all members of the expedition, including adults, to be at all training sessions. You will probably need to announce one make-up session. Realizing they will have to make up missed meetings, most members and adults will arrange their schedule to attend the initial training sessions.

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Appendix I
4-H Underwater Expedition Training: A Model Example

Example agenda used by the Duval County 4-H Program and the N.E. Florida Sea Grant Extension Agent to train teen 4-H'ers and adult leaders in underwater research methods.

4-H Underwater Marine Expedition Training Agenda

Purpose: To increase open water SCUBA diving skills and provide new knowledge in underwater science research methods through direct experiences.

To enable teens to learn, practice and analyze leadership skills in controlled situations having some risk for failure while engaged in a realistic underwater scientific expedition.

Session 1	Orientation to Underwater Marine Expedition Training Program & Underwater Research Methods. Inspection of SCUBA Equipment. Review of Basic Diving Skills & Decompression Tables.
Session 2	Open Water Dive--Underwater Photography and Video as Data Gathering Tools.
Session 3	Underwater Mapping Methods Dive and overnight camping trip.
Session 4	Observing and Documenting Underwater Life.
Session 5	Offshore Diving Procedures

Session 6 One Week Marine Expedition Trip. We will travel to the Florida Keys where an intense study of the territorial fish on a single coral reef will be studied.

Expedition Trip Agenda

17 & 18 July............Travel to Florida Keys.
18th July 12:00 p.m....Arrive at Sea World Lab, Long Key. Move into rooms and eat lunch.
1:00 p.m.....Orientation and begin planning.
19, 20, 21 July.........We will be diving off a 40' charter boat which is located in Marathon. The dives will begin with boat loading at 7:30 a.m. each day, on Tuesday, Wednesday, and Thursday and end by 12:30. After the dive trip, we will return to the Lab to work up our data and plan for the next days activities.

General Schedule Each Day:

6:00 a.m.	Wake up and Breakfast.
7:00 a.m.	Depart for Marathon.
7:30 a.m.	Load Charter vessel and depart.
12:30 p.m.	Return to shore, fill tanks.
1:30 p.m.	Return to Lab, eat, work up data and plan next days activities.
6:00 p.m.	Dinner at Lab.
8:00 p.m.	Debriefing and briefing for next day.

21 July - 3:00 p.m. Briefing for Juvenile Spiny Lobster Project.
22 July - 8:00 a. til ??? - Spiny Lobster Research Project
23 July - Breakfast cleanup and departure from Lab.

RESIDENTIAL, MULTICULTURAL LEADERSHIP PROGRAMS FOR HIGH SCHOOL STUDENTS

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Introduction

In 1978, on a Saturday in October, a group of educators assembled at a centre north of Toronto to begin the preplanning for a Multicultural Leadership Program for high school students. The group of educators consisted of teachers, administrators, consultants and officials of educational institutions in Ontario. Over the next two days Ron Butcher from the Ontario Human Rights Commission and I modelled a program which we had developed with the support of Mavis Burke, an education officer for the Ontario Ministry of Education.

On the following Monday 120 Grade 11 students from 12 different high schools representing six Boards of Education from the Toronto metropolitan area arrived at the centre. For the next five days 12 facilitators and 12 visiting teachers worked intensively with 10 student groups in order to assist them in improving the multicultural climate in their school or community.

Over the past 10 years a number of urban boards have established their own programs to the point where about 500 students per year are being served by programs sponsored by local school boards. For instance, the Toronto Board of Education, one of the original six boards, offers two programs per year for 100 students each under the auspices of the Advisor of Race Relations, Tim McCaskell. A manual for their program has been produced. (McCaskell, 1988).

Implementation Strategy

The original plan was to operate at two levels of implementation. Because Ontario has a population of 7.5 million a central implementation plan was seen as futile. The population is also quite diverse making a centralized model unsuitable for regional needs. These two concerns established the parameters for a central program which had as its first task to provide a strong, effective program and as its second task to serve as a model so that Boards could use it to develop similar programs to serve their regional needs. The visiting teachers were urged to approach their Boards to establish such programs and the school selection process automatically built an understanding and an interest in the idea.

Selection Process

The Ministry of Education through its Special Programs Branch selected school boards which selected high schools. The school principal selected a teacher who selected ten students, 5 males and 5 females. Criteria of acceptability were established at each selection level to maximize participation and to establish some interest. For example the Board had criteria in the selection of a school and the principal was given the characteristics expected in a suitable teacher. By doing things that way all levels were aware of the program and knew that Board implementation was a projected, but not compulsory outcome.

Setting and Program Size

Any residential setting with a surrounding open area is suitable. A large playing field would be quite functional although for some activities a larger and more natural setting would be an asset. The food and accommodation should not be an intrusive element of program. We found that special meals are a requirement for some ethnic minority cultures and the Ministry program went to some lengths to provide the necessities.

Groups work well in multiples of 12 to 14 including staff. Larger groups reduce airtime during debriefing sessions and smaller groups reduce the intragroup interaction that forms the basis for most of the activities. I would suggest a minimum of four groups and a maximum of twelve to promote interaction and management.

Program

The program components are commonly found as classroom or outdoor education activities that encourage self-concept (Canfield, 1976), interpersonal communication (Johnson, 1972), non-verbal communication (Wolfgang, 1979), group tasks (Johnson, 1975), critical thinking (Elbow, 1986), and participative leadership (Dimock, 1970). These concepts are admirably developed in the texts listed. The unique tasks for this program were to construct a residential component that used the time to good advantage, to skew the activities to multicultural themes and, most importantly, to work out sequences of activities which would fit the theories of group development as well as provide low risk and a high level of involvement.

The Residential Component

Because of curriculum foci high school residential programs tend to be intensive and concentrated in a limited subject area. In our program visiting teachers were expected to manage overnight duties with the help of the facilitator staff. Groupings for the program consisted of three types:

a) family groups of 12 students and two adults which were random groupings from the participating school,

b) school groups of 10 students all from the same school,

c) the community group consisting of all students and staff.

Cabin and meal groups were made up out of the family groups to promote interaction and to provide a fresh start for all the students.

Multicultural Themes

John Kehoe has been engaged in research about multicultural education for about fifteen years (Kehoe, 1984). His research has indicated a number of parameters that relate to program design specifically geared to multicultural and race relations themes. As part of the development of this program, Kathleen Fraser of the Ontario Human Rights Commission extracted a group of research findings.

In order to explain the general approach to multicultural aspects of the program, I have developed a Conceptual Framework which lists concepts for which most Canadians would be in agreement about advancing multicultural themes as a societal goal. We used the research findings and a preliminary notion of the Conceptual Framework to develop activities for the program.

Whereas each society would need to develop its own research base and its own notions of what multiculturalism and race relations mean, I think that developing such programs without a thoughtful investigation of those concepts would be premature.

Group Development Sequences

The program was set up to develop two consecutive sequences of activities. The first sequence involved family groups and took up the bulk of the first two days. The second sequence involved school groups and lasted two or three days. Both sequences began by building communication and trust between members in the group, developing group cohesion using problem-solving activities and then dealing with elements of prejudice and racism in a supportive environment.

The first sequence provided a base for protected self-disclosure and group support for individuals facing prejudice. An effort was made by the facilitator to protect the individuals and the process. Good facilitator training is one of the primary requirements for these programs. One of the most important expected outcomes of the first sequence was heightened self-esteem and a better understanding of the nature of prejudice.

The second sequence was intended to develop critical thinking and problem-solving skills. In the initial part of this sequence the first set of activities was repeated in spirit using different activities but progress was much quicker. The remaining time focused on the home school and the racial problems that students faced there. As the sequence progressed the group began to develop ways in which the perceived problems could be solved or moved toward solution. The role of the facilitator and visiting teacher in this sequence was to move toward closure. Outcomes were not prescribed by the adults in the group. Suggestions were made; questions were asked; but, the students typically came up with a plan of action to take home. The final day was spent in closure and evaluation.

In many residential programs sequencing activities is not a highly developed art. Attention to group development patterns could probably improve many types of programs. That attention is important when dealing with an issue as sensitive as racism.

Community activities were generally done in the evening. They varied from skits to square dancing, presentations of school or community plans of action, or large group sports activities. One particularly good activity was WHIM, World History in Minutes, where the large group modeled quick review of world history seen from five or six different perspectives. It was quite instructive in showing how patterns of racism developed and gave students a perspective about their personal history.

Ethics

Ethical behaviour by all teachers when they are working with students in the classroom is expected as a part of what it means to be a teacher. Ethical behaviour in programs that deal with sensitive issues is particularly important because the sensitive issues of racism and prejudice are heartfelt issues.

The issues of facilitator ethics are well-covered. There is a need to assure everyone that students will be managed in an open and positive climate with a problem-solving focus. Serious personal concerns among members of groups should be dealt with outside the group by qualified staff.

Outcomes and Evaluation

Outcomes are difficult to judge in a program as complex as this one. Kehoe (1974) provides an instrument to measure the multicultural climate in a school and we have used it as part of the second sequence. In spite of one effort to evaluate the effect of the Ministry program over time, no proper evaluation of the programs has been done. School social structure is attracting a growing literature (McLaren, 1986, Rutter, 1979 and Sizer, 1984). Changes in a school's climate are caused by many factors and schools tend to have a chameleon-like relationship with their local communities, but we have been given to understand by the students that the program has been very good for them and that the idea continues to spread, is hopeful.

If students feel they can become self-reliant and community-minded regardless of racial or cultural origin, many of our social ills will evaporate. The school must be a vehicle for support for multiculturalism and racial harmony in its classes, administration, community focus and curriculum.

APPENDIX I

Checklist of Research Findings Important to Program Activities

1. The "to know is to tolerate" principle for a program may actually increase prejudice in prejudiced members of the group.

2. Vicarious experience approach using moral dilemmas is effective; role-playing a previously unacceptable situation is effective.

3. Combination of movies, drama and fiction is effective, especially reading, acting and listening to experience of minority members.

4. Case histories of others holding and expressing prejudice will allow for discussion, face-saving and change.

5. Expression of inconsistency between a person's expressed view and related value will create new thinking.

6. Accentuate the similarities, not the differences.

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7. Information presented should be within a person's latitude of acceptance.

8. Trust affects the learning of content.

9. Experts are believed and create more attitude change.

10. Personal contact reduces prejudice, especially where tasks are shared.

11. Moral dilemmas encourage students to more mature conclusions.

12. Avoid dramatizing the evils of racism.

13. Establish a non-competitive social structure.

14. Stress group rather than individual accountability for racism.

15. Use new unfamiliar tasks.

16. Expectation of majority students to be dominant must be dealt with early in the session.

17. Resource leaders should be multicultural in background.

18. Do not emphasize academic ability or competition ordering.

19. Help students understand the reasons for teasing and hostility.

20. Do not expect interracial friendships to develop as a consequence of the program.

21. Cooperative curricula and non-competitive social structure.

22. Give opportunities for individuals to be successful on four different tasks in presence of peers and with the encouragement of the facilitator.

23. Belief in prejudice as inappropriate leads to greater leniency toward minorities.

24. Majority members can test values in safe situation with minority members present.

25. People who are told they are prejudiced underreact to minor situations and overreact to major situations.

26. Reverse discrimination occurs with interracially naive subjects.

27. Prejudice exists in everyone; expressing that to oneself improves the ability to tolerate others who may exhibit prejudice overtly.

APPENDIX 2

Conceptual Framework for a Multiculturalism Program

A. Multicultural Policy

1. All persons deserve equal treatment before the law, regardless of cultural or racial origin.

2. All persons regardless of cultural or racial origin must engage in ethical behaviour as defined by the host culture.

3. All persons have the right to engage in cultural activities which are ethical in the host culture.

4. All persons should support by consent or participation those cultural practices of others which are ethical.

5. Support for ethical cultural practices should as a consequence confer equal opportunity for all persons in all aspects of the host culture's economic and social policies.

B. Multicultural Educational Policy

1. Multicultural education emphasizes the need for accepting and respecting the rights of minorities to engage in ethical cultural practices and recognizes the rights of minorities before the law and to equal opportunity in economic and social policies.

2. Multicultural education provides all students with the skills, knowledge and attitudes they need to function in a multicultural society.

3. Multicultural education teaches students about their cultural heritage so as to provide a basis for personal identity.

4. Multicultural education can have these positive effects on the individual:

   a) significantly increasing self-esteem among minority group students.
   b) providing clear support for minority group students in the school system among administrators, teachers and other students.
   c) providing clear support for parents within the community.
   d) providing good example for the public at large.

5. Multicultural education can have these positive effects on the host culture:

   a) reducing the negative effects of an alien host culture for immigrants.
   b) providing opportunities to experience cultural practices of other groups.

c) enlarging the society's perception of itself in the world.
d) engendering good will in countries that provide emigrants.
e) increasing ways in which citizens can perceive, experience and solve problems in the host culture.
f) helping to formulate a more just social policy.
g) providing clear support in society for all minority groups.

6. Multicultural education, for success, requires policies:

a) by the state to promote multiculturalism in society.
b) by the school system to promote multicultural practices in its schools.
c) by the school to promote equitable treatment of minorities and special support for immigrants.

C. Sources and the Nature of Prejudice

1. Most prejudice in a culture can be attributed to unquestioning conformity to narrow social norms, i.e. those who fail to conform can be the object of a range of behaviours from avoidance to aggressive hostility.

2. Prejudice toward cultural groups often results from a personal experience with an individual perceived to be a member of that culture.

3. Prejudice can be taught.

4. Prejudicial actions lower the self-esteem of the victim and may cause that person to exhibit negative behaviour to others or to the society's ethical norms.

5. Educational programs that effectively reduce prejudice provide:

a) opportunities to improve self-esteem.
b) case studies for discussion.
c) opportunities for vicarious experiences of the culture.
d) establishment of cooperative activities rather than competitive ones.
e) personal contact over time.
f) demonstration of similarities rather than differences.
g) peer teaching.
h) establishment of a program where everyone is facing new challenges.
i) multicultural resource leaders.

6. Educational programs that do not reduce prejudice:

a) provide information about minority cultures.
b) encourage competition between groups.
c) stress the differences between cultures.
d) encourage academic achievement and social conformity.
e) provide the student with ideas outside the student's latitude of acceptance.

f) force integration as a school system policy.

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VERMONT STATEWIDE LAND USE CONTROL, ACT 250 WITH THE IMPACT OF ACT 200

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Vermont is a state of small towns and rural countryside set against forested mountains. In the past four decades the major industry has shifted from farming to recreation with the resulting disruption of the land. The problems were recognized in the late sixties when it became apparent that local planning and zoning were not able to control development. The governor of the state, Dean Davis, appointed commissions in each part of the state to work on this problem. Their work and that of the General Assembly resulted in the passage of legislation to control growth. The permit process that developed was tied to the region and the towns as well as to state agencies with the ultimate goal of improving regional and local planning and agency participation in the permit process. As the law was implemented, problems arose and were addressed by the newly created Environmental Board, the General Assembly, regional planning commissions and others. However, the local plans did not improve as much or as universally as anticipated and efforts were made to encourage local action. Amendments were made to the enabling legislation that authorized local and regional planning. (Vt. Stat. Ann. tit. 24, Chapter 117) Finally in the legislative session of 1988, Act 200 was passed relating to the local and regional planning process. Whether or not this Act will help in the control of development waits to be seen.

Local control was an issue with Act 250. However, that Act provided for town participation in the permit process. Town plans could be written to address each of the ten criteria; both the select board and the planning commission were statutory parties to the process. Act 200 gives more power to the regional commissions and can take away local autonomy in the Act 250 process. Control of development is the objective of both pieces of legislation.

History

In 1970 the General Assembly of the State of Vermont passed Act 250 as a response to rapid and unregulated growth in several parts of the state. The regulatory portion of this act established a system which authorized the state Environmental Board and the nine District Environmental commissions the power to grant or deny permits for major developments or subdivisions within the state (Vt. Stat. Ann. tit. 10).

Act 250

The Act defines land development as "the division of a parcel into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any building or other structure, or any mining or excavation or landfill, and any change in the use of any building or other structure, or land, or extension of use of land." It also defines person as "an individual, partnership, corporation, association, unincorporated organization, trust, or any other legal or commercial entity, including a joint venture or affiliated ownership. The word person also means a municipality or state agency." (Vt. Stat. Ann, tit. 10 amended 1987)

The District Environmental Commissions are quasi-judicial bodies made up of lay people, living within the district served, who have "the authority to determine whether and under what conditions a land use permit may be issued for development or subdivision of land subject to the jurisdiction of Act 250." The Commissioners are assisted by full-time staff members known as district environmental coordinators. The Environmental board has the authority to "prepare and adopt rules to interpret and carry out the provisions of Act 259. It also hears appeals from the decisions of the district commissions; and provides at de novo hearings the same function as the commissions.

Leonard Wilson, in his performance evaluation of the Act said, "The overall goal of the permit process is to insure that development projects are not unduly detrimental to the environment, that they promote the general welfare through orderly growth, and that they are suitable to the needs and demands of the people of the state." The specific purposes of the Act are:

1. To improve the development of Vermont.

2. To safeguard the health and property of the citizens and landowners by minimizing undesirable side effects of major new developments.

3. To minimize harmful impacts of large-scale developments on the fiscal health and social fabric of small towns in Vermont.

4. To protect the state's natural resources -- including air, water, soil, wildlife habitat, and scenic and historic resources--from unnecessary degradation.

5. To contribute to the economic health and growth of the state by protecting the values that make the state attractive for development and by protecting existing and new development investments.

6. To create a statewide system of planning for growth and for guiding development to those areas where the natural environment and existing infrastructure are best suited to its accommodation, and to stimulate planning and development control at the local level throughout the state.

7. To provide a forum for review of the potential impacts of new developments where all concerned parties have the opportunity to express their views but where the rights of landowners, developers and others are protected by fair and efficient procedures. "In Wilson's opinion, these goals and objectives were still viable ten years after the passage of the Act." (Wilson, 1981)

The ten criteria listed in the Act are the basis for the decision-making by the commissions and board. Each criterion must be successfully met before a permit to develop is granted. The District Commissions review each application and hear testimony from the statutory and other interested parties at public hearings. The statutory parties are: the applicant, the town (both the select board and the planning commission), concerned state agencies, and

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the regional planning commission. Adjacent property owners are also statutory parties. However, in order to have party status they must declare their interest and which criteria they wish to be heard under prior to the actual hearing. Other organizations seeking party status can request such status prior to the commencement of the hearing. For example, if the land to be developed involved a natural resource such as a wetland, the Vermont Natural Resources Council, a private conservation organization, could apply for party status. The commission decides whether or not to allow such organizations to have party status and under which criteria to hear them. The commission also hears from others as commission witnesses.

Briefly the ten criteria are summarized below:

CRITERION 1: WILL NOT RESULT IN UNDUE AIR OR WATER POLLUTION

CRITERION 2 & 3: HAS SUFFICIENT WATER AVAILABLE FOR ITS FORESEEABLE FUTURE NEEDS AND WILL NOT CAUSE AN UNREASONABLE BURDEN UPON EXISTING WATER SUPPLY TO BE USED

CRITERION 4: WILL NOT CAUSE UNREASONABLE SOIL EROSION OR REDUCTION IN THE CAPACITY OF THE LAND TO HOLD WATER WHICH MAY RESULT IN A DANGEROUS OR UNHEALTHY CONDITION

CRITERION 5: WILL NOT CAUSE UNREASONABLE OR UNSAFE CONDITIONS WITH RESPECT TO USE OF HIGHWAYS, RAILWAYS, AIRPORTS OR OTHER MEANS OF TRANSPORTATION EXISTING OR PROPOSED.

CRITERION 6: WILL NOT CAUSE AN UNREASONABLE BURDEN ON THE ABILITY OF A TOWN TO PROVIDE EDUCATIONAL SERVICES.

CRITERION 7: WILL NOT PLACE AN UNREASONABLE BURDEN ON THE ABILITY OF LOCAL GOVERNMENTS TO PROVIDE MUNICIPAL OR GOVERNMENTAL SERVICES.

CRITERION 8: WILL NOT HAVE AN UNDUE ADVERSE EFFECT ON SCENIC AND/OR NATURAL BEAUTY OF THE AREA, AESTHETICS, HISTORIC SITES OR IRREPLACEABLE NATURAL AREAS. (INCLUDES NECESSARY WILDLIFE HABITAT)

CRITERION 9: IS IN CONFORMANCE WITH A DULY ADOPTED CAPABILITY AND DEVELOPMENT PLAN INCLUDING:

    IMPACT OF GROWTH
    PRIMARY AGRICULTURAL SOILS
    FOREST AND SECONDARY AGRICULTURAL SOILS
    EARTH RESOURCES
    EXTRACTION OF EARTH RESOURCES
    ENERGY CONSERVATION
    PRIVATE UTILITY SERVICES
    COSTS OF SCATTERED DEVELOPMENT
    PUBLIC UTILITY SERVICES
    DEVELOPMENT AFFECTING PUBLIC INVESTMENTS
    RURAL GROWTH AREAS

CRITERION 10: IS IN CONFORMANCE WITH ANY DULY ADOPTED LOCAL OR REGIONAL PLAN OR CAPITAL PROGRAM (HOWE, 1980).

Local Control in Act 250

The towns of Vermont have the power to exercise a measure of control in the environmental decision-making process at the local level of government through well designed and implemented town plans. If the goals of the town for future growth are clearly stated in the plan; resources and constraints identified; and the criteria of Act 250 addressed; the planning commission can assess each application for development under the Act with competency, and can provide meaningful testimony. In addition, if the planning commission keeps updating its inventory of natural and cultural resources and costs of government, the select board is able to respond to criteria 5 and 6 as well.

In the early years under the Act, the inadequacies of the town plans became every more apparent. The goals and objectives related to growth were so general that they could not provide the guidelines to development called for in the Act. The regional planning commissions assisted the towns in the planning process and at the same time updated the regional plans, but the needs were so great that they could not be met. The towns needed expert help in the planning process and in the implementation process. Some towns were completely without town plans. The town plan had always been considered a philosophical document, but with criterion 10 of Act 250 it became much more than that. It became an important part of the statewide permit process and necessary for local control of large scale development.

Development pressures did not go away in Vermont, rather, they increased. (Wilson 1981) Many towns continued to work toward adequate town plans either by themselves, assisted by the regional commissions, or with the help of planning consultants. Reports such as Stephanie Kaplan's, The effect of Act 250 on Prime Farmland in Vermont, pointed out the problems related to the town plans and to the permit process itself.

Act 200

This Act has changed Title 24 Vermont Statutes Annotated chapter 117, the Act that enables regional planning commissions to plan and municipalities to plan and write ordinances to implement the plan. The goals of this Act in abbreviated form are given below.

Vermont's Planning Goals

* A coordinated, comprehensive planning process and policy framework shall guide decisions by municipalities, regional planning commissions and state agencies.

* Citizen participation shall be encouraged at all levels of the planning process, and decisions shall be made at the most local level possible commensurate with their impact.

* Consideration must be given to the use of resources and the consequences of growth and development, not only for the community, but for the region and the state.

- Whenever appropriate, municipalities shall be encouraged and helped to work creatively together to develop and implement plans.

- Important and economically viable agricultural and forest lands shall be protected by limiting alternate uses on those lands to low density use designated to preserve the long term viability of farm or forest use.

- Fragmentation of lands identified as important for agriculture and forestry shall be discouraged.

- The quality of air, water, wildlife and land resources shall be maintained or improved.

- Special resource areas shall be identified, development shall be planned so as to protect and preserve them and, when necessary, they should be placed in whatever form of public or private ownership that would best maintain and utilize their value to the public.

- Strategies to facilitate the appropriate extraction of earth resources and the proper restoration and preservation of the aesthetic qualities of the area shall be addressed.

- Energy conservation should be actively encouraged and wasteful practices discouraged.

- Public access to noncommercial outdoor recreational opportunities shall be identified, provided where feasible, and protected.

- Growth shall be planned to maintain and enhance recreational opportunities for Vermont residents and visitors.

- Those natural resources referred to in Act 250 should be planned for development and use consistent with the environmental principles found in Act 250.

- Public investments, including the construction or expansion of infrastructure, shall be made so as to support development in a locally designated growth area, and shall not be made so as to lead to development in important and economically viable agricultural or conservation areas.

- The rate of growth should not exceed the ability of the town and the area to provide facilities and services.

- The development and provision of government and public utility facilities and services should be based upon a projection of reasonably expected population increase and economic growth, and should recognize the limits of the state's human, financial, and natural resources.

- Development shall be planned so as to maintain the historic settlement pattern of compact village and urban centers separated by rural countryside.

- Economic growth shall be encouraged in locally designated growth areas, or employed to revitalize existing village or urban centers or both.
- Intensive residential development shall be encouraged primarily in areas that are identified as village or urban centers, and strip development along highways shall be discouraged.
- Development should be permitted at reasonable population densities and reasonable rates of growth.
- Economic development should be pursued so as to provide maximum economic benefit with minimal environmental impact.
- Expansion of economic opportunities shall be addressed in areas with high unemployment or low per capita incomes.
- Access to educational and vocational training opportunities shall be addressed.
- Strategies to help the agricultural and forest industries remain viable shall be developed.
- The manufacture and marketing of value-added agricultural and forest products shall be addressed.
- The construction, expansion or provision of public facilities and services should be planned so as to not significantly reduce the resource value of important and economically viable adjoining agricultural or forestry lands.
- The housing requirement for Vermont's expanding resident population, particularly for those citizens of low or moderate income, must be met by the construction of new housing units and the rehabilitation of existing structures.
- Sites for multi-family and manufactured housing should be readily available in locations similar to those generally used for single-family conventional dwellings.
- There should be a reasonable diversity of housing types, and a choice between rental and ownership for all citizens in a variety of locations suitable for residential development and convenient to employment and commercial areas.
- Transportation systems should provide convenience and service commensurate with need, should respect the natural environment, and should be energy efficient. Public transportation shall be addressed.
- New construction or major reconstruction of highways should provide pedestrian paths when economically feasible and in the public interest.
- Development and expansion of governmental and public utility facilities and service should occur, where appropriate, within highway or public utility right of way corridors.

The most controversial issue in Act 200 is the new role of the regional planning commissions. Besides helping towns to write town plans they also approve or disapprove the plans when written. They must decide whether or not the new plans contain all the planning goals of the Act. If the town plans are not approved by the regional commission, the town plan cannot be used in the Act 250 permit process, and the regional plan only can be used. Appeal by the towns is limited to a new board, Council of Regional Commissions.

The membership of the Council of Regional Commissions is as follows: a representative from each regional commission, three members who are state agency or department heads appointed by the governor and two members appointed by the governor representing the public. This council has many other duties beyond hearing appeals to the opinions of the regional commissions. It will review regional plans and various state agency plans and ensure that they are compatible with each other and the Vermont Planning Goals. (Vt. Stat. Ann. tit. 24 Chapter 117 as amended by Act 200)

It should be noted this Act creates a new level of government with all members appointed. The members of the regional commissions are appointed by town selectmen, the agency personnel are appointed by the governor as are the two members from the public at large.

The Act also provides funding for town planning efforts. Some administered through the regional commissions and some through grants to towns. The funds are limited, not adequate to meet the needs of the towns.

The issue here is one of local control or state control. Vermont towns are noted for their independence. The degree of state control that emerges from this new law will reflect the input from towns across the state. Act 250 has been considered by some town officials and some developers to be an infringement on local control and private enterprise. Act 200 has the potential to be a much greater infringement.

Act 250 has helped to control growth in Vermont. It has pushed towns into planning but perhaps not fast enough. Because of this Act development has been controlled so that the natural resources of Vermont have been protected significantly. There is general agreement within the state that agricultural land, wetlands, wildlife habitats, mountain tops and other fragile areas need to be protected. Act 250 was not meant to stop growth, but rather to control it, to encourage development in the most appropriate sites. In this it has most certainly succeeded. With Act 200 in place there is the potential for better town and regional plans to provide more effective control of development through the Act 250 permit process in Vermont.

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HOMEMADE SLIDE PROGRAMS AS EFFECTIVE LEARNING EXPERIENCES

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In the search for unique and effective learning experiences, there is one technique which has been overlooked by many: homemade slide programs. Although professional film and filmstrip instruction has been a part of formal and informal classrooms for years, 35mm slide presentations are not common. Nevertheless, these audiovisual materials are inexpensive, extremely flexible, and easy for the novice to assemble. A few suggestions from someone experienced, your creativity, and minimal commitment to time and equipment can produce a variety of excellent learning experiences for any age level of student.

Initially, the teacher needs to decide on a theme for the program. Topics could include special locations (present it as a mock field trip), special events (these usually cannot be repeated in the classroom),specific tasks (making maple syrup), or a focus on a particular person or career. Groups of animals, habitats, and patterns in nature are also quite suitable. Whether the subject matter supports the existing curriculum or represents a new topic does not matter. Successful slide programs have been developed in all areas, but they should be designed to meet the particular interests and abilities of the viewers.

Another important concern is to understand that programs can be created by taking your own slides or by purchasing slides at gift shops in popular vacation spots. You could also borrow slides from an avid photographer or purchase them through science supply catalogs. With today's automatic cameras (along with the possibility of borrowing a camera) the task is not at all difficult, but slide film must be purchased instead of print film. Any camera store personnel should be happy to help even if you have never before used at 35mm camera. The price of purchasing film and developing 36 slides will vary with the type and quality of each, but this can be accomplished for $10-15.

The "homemade" aspect of the project now enters the arena although some planning should occur before any slides are taken. Arrange the pictures in a story-line format. Make note of gaps which could be filled with diagrams, maps, figures, or words. Number each slide with a pencil and place an asterisk in the lower left hand corner when viewed correctly. This mark will then be placed on the upper right as slides are dropped into the carousel tray. This is also an opportune time to write a script for the presenter. Include narration, key questions, and extra information next to the number of each slide. Remember that an effective practice is to inform viewers what will be seen or to challenge them to watch in order to answer questions.

These are the basic steps for creating and assembling a slide program, but there are many additional ideas which can enhance the final product. It is essential to follow the principle of keeping the project simple. Young children will be delighted with a slide program of about 15 pictures. Don't overload audiences like the stereotypical vacationers. Work from a core of critical slides; then add support as needed.

At every good camera store customers can purchase slide mounts for under ten cents each. These "frames" are used by photographers to mount their own slides into a plastic or cardboard support. There are several types: some snap shut, some must be heated with a warm iron, others just permit film to slip into the frame. The mounts can be used for making titles and inserting questions or other words into a program. These can easily be handwritten or typed on clear transparencies (use the sheets for overhead transparencies). To add background color, overlay pieces of the transparent covers used for term papers (these are available in bookstores). Many new photocopy machines reduce and enlarge originals, so the possibilities of stretching or shrinking printing and good graphics are limitless. The only constraint is that the final product must fit into the 3.5mm by 2.3mm opening of the slide mount. Again, keep the amount of information on any one slide minimal.

Another tool which is inexpensive and seldom used is a set of close-up rings for 35mm cameras. The package of three filter-like lenses retails for about $20 at camera stores and enables a beginning photographer to expand the use of the camera without major financial commitments. The rings can be used singly or in multiples for close-ups of natural objects and for copy work. Copy work can be a very complicated and expensive procedure, but good quality slides can result with a little practice and simple equipment. Use a tripod if possible, blackout edges and backgrounds with black felt, and watch for shadows and glare. Remember that copying maps, diagrams, or pictures from magazines and other resources should be for your own instructional use and should not violate copyright laws.

The final phase of the project should be to polish the program so that it is aesthetically pleasing. Select appropriate background music (check your library for sources) and assemble a box of hands-on equipment if appropriate. Fossils, rocks, and driftwood collected from the beach can add interest. Equipment used by a forest firefighter can be borrowed and shared in the classroom even though a guest speaker cannot be present. Remember also that audiences are usually eager to hear about the program from the author; don't neglect to provide this special insight throughout the narration.

The spin-offs from the format discussed above are many. The slides can be used in other settings and the program expanded or condensed to meet the needs of different ages and interests. This is also a good technique for developing custom-made programs for presentation at parent and community meetings. Slide shows are excellent ways to summarize a unit or year of projects as well as to introduce viewers to what lies ahead.

Another outstanding project is to have student-made programs. Students can easily assemble their own slides by writing on transparencies, drawing simple diagrams and pictures, and making transparencies from other sources. These homemade slides can be used alone or together with photographic slides.

After the techniqués are mastered, creative ideas will trigger new projects. Safety, transportation, and time constraints have resulted in few field trips for youngsters, so consider the homemade slide program as an effective substitute. Another option is to document actual field trips. Go to the site before the entire group to capture some important scenes.

Remember that safety is paramount, so do not attempt to be the photographer while you bear the full responsibility for being the leader and supervisor.

The author's students created programs including raising and harvesting popcorn (of course, cooked samples were provided afterwards), a day at the Indianapolis 500 race (with appropriate background sounds), and visiting farms to see baby animals. Ideas can be simple, everyday events which can be more closely examined in an instructional setting or unusual, once-in-a-lifetime opportunities saved for posterity, yet recycled for viewing by others. With a little practice and a moderate amount of enthusiasm, you can create homemade slide programs which will provide effective group learning experiences.

ENVIRONMENTAL EDUCATION AND ENVIRONMENTAL ADVOCACY: THE NEED FOR A PROPER DISTINCTION

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In 1969 Bill Stapp wrote about environmental problems and proposed a new approach designed to reach citizens who were increasingly being asked to make decisions which would affect environmental quality. He called this new approach environmental education. Environmental education quickly became a rallying symbol, or slogan, capturing the ideas and attitudes of a growing educational movement and drawing attention to the need for a citizenry which could think clearly and critically about environmental issues. While slogans are often useful they can, in time, be taken as literal doctrines or arguments (Scheffler, 1960). It is now important to evaluate environmental education, and goal statements attributed to it, as straightforward assertions.

Taken at face value, the term environmental education must first be concerned with education and second with content about the environment. Environmental educators must acknowledge that this field of study is legitimated by the degree to which it supports the broader concept of education. I will argue that our failure to pursue environmental education within a clearly articulated framework for education has weakened its conceptual basis, and that it may frustrate efforts to make environmental education more persuasive. I believe that these problems are exacerbated by a failure to be clear about the different roles that we may choose to play in society. While it may be important for citizens to actively promote changes in attitudes and behaviors, this must not be confused with our work as educators. We must, I will argue, be sure that we are educating rather than advocating a particular environmental view.

Education is concerned with the acquisition of worthwhile knowledge and understanding (Peters, 1966; Barrow & Woods, 1982; Chambers, 1983). In stressing understanding I wish to make it clear that an accumulation of disjointed facts is not enough. The educated person must also be able to perceive relationships between these bits of information and the conceptual schemes which allow us to organize the facts--they must have some understanding of the 'reason why' of things. The educated person will not just perform certain operations in a certain way but will have some understanding of the principles which govern such actions. It is important to recognize that a crucial distinction exists between "education" and "training". Training is concerned with the acquisition of skills and abilities and frequently has instrumental connotations. For example, we speak of training as a plumber, training as a secretary, or training as an engineer. In contrast, we speak of a person being more or less well educated, indicating a broader and less determinate understanding which transcends immediate instrumental values. Surely, what we most want as educators, is to enable students to think clearly and critically about the world that they live in, including their environment and the issues which surround human relationships with that environment.

The question now is: Do the espoused goals for environmental education enable students to think clearly and critically about their environment? A common expression of environmental education's ultimate goal is that it should seek to produce "environmentally affirmative citizenship" (Hungerford & Volk, 1984). It is not difficult to imagine a well-educated person who is committed to a particular environmental viewpoint or involved in mediating environmental conflicts. However, it is inconceivable that the production of such citizens should be a necessary or sufficient outcome of environmental education. As we have seen, we do not apply the term 'education' to the achievement of some particular end. We normally use the term 'training' for the development of such specific behaviors. Thus we may train a person as an activist, advocate, or as an environmentally-affirmative citizen. If we push this point further we will recognize that the term 'environmentally-affirmative' has evaluative connotations. We are implored to provide an education which results in environmentally affirmative rather than environmentally-negative students. The thrust of this 'ultimate goal' for environmental education is now clearly seen to encourage the modification of individual behavior in a prescribed direction. Education, however, transcends such immediate instrumental values such as the advocacy of a particular sort of behavior.

A second frequently held goal for environmental education is that we should aid citizens in becoming environmentally knowledgeable, skilled, dedicated, and willing to work toward the achieving and/or maintaining a dynamic equilibrium between quality of life and quality of environment (Harvey, 1977). Again we must raise questions about the nature of such a goal. First the concept of 'skill' is closely tied with notions of training and perfection through practice, and minimally involved with understanding, and the goal of modifying behavior is purely instrumental in nature. Second, the object of these intentions is unclear: what is a dynamic equilibrium between quality of life and quality of environment? I for one am not sure that I would recognize such a 'dynamic equilibrium'. What we appear to have here is an attempt to reduce complex moral reasoning to a concept derived from the sciences. Such reductions will ultimately do little to assist our students in making judgements about what ought to be done.

Also suspect are goal statements which speak of "training in environmental problem-solving skills to enable citizen participation in environmental issue remediation" (Ramsey, et al. 1981). While I doubt very much that it is possible to reduce the ability to solve problems to a set of skills in the first place, we are again talking about training and not education. Beyond this, however, we should consider the likelihood of students actually solving infinitely complex environmental problems. Perhaps we do not assign sufficient concern to our vast areas of ignorance concerning the complexities inherent in phenomena commonly regarded as environmental problems (Kennedy, 1983). Furthermore, to urge action which is unattainable and futile is a disservice to persons, and to serious thought about these problems. Surely it is not "overt environmental behavior" (Ramsey, et al. 1981) that we wish to foster in the name of education. I would like to think that, in many instances, a thoughtful rational student would decline to act if the arguments presented were not clear, or if insufficient information was available to make an informed decision.

Our task is not to produce 'environmentally-affirmative citizenship', or 'environmentally active individuals', or simply to 'develop problem-solving skills', or to encourage 'independent overt environmental behavior', or to achieve 'overt citizenship action'. Our task is clearly to educate. This is inextricably linked to acquisition of knowledge and understanding, commitment to understanding the 'reason why' of things, and care about the use of reason. Specific overt action cannot necessarily be expected of the educated person. He or she may not feel adequately informed, may perceive unresolvable conflicts, or identify greater priorities elsewhere. Even less can we expect overt action to follow a prescribed course, or to take a pre-determined direction. It would be presumptuous to expect the educated person to display environmentally-affirmative citizenship. Educational achievement should enable individuals to act intelligently, but people will not act intelligently if they have been trained, brainwashed, conditioned, indoctrinated, cajoled, coerced, or bribed to behave in a certain way.

What, then, should be the future direction of environmental education? Rather than attempting to achieve a behavioral response, we should give more weight to questions about what constitutes knowledge and understanding, and what environmental content would be most worthwhile. I believe that we must redirect more of our attention to epistemological responsibilities. What different ways of thinking, or forms of knowledge and understanding, are required by our students to think clearly about environmental problems? At the very least we must ensure that they can distinguish between empirical and philosophical questions, a point lost in much environmental education literature. As Australian philosopher, John Passmore (1974) points out in his brainteaser: "Ecological problems are not problems of ecology". By this he means that environmental problems are, by their very nature, different from problems of science. While science will inform our thinking about an issue, this mode of inquiry can only tell us what *is*, or project what *might be*, the case. It is moral reasoning that will enable us to decide what we *ought* to do. There must, therefore, be distinct opportunities in environmental education for students to learn to think scientifically and philosophically.

Thinking clearly about environmental issues also requires the ability to bring into play a breadth of modes of inquiry and understanding. Students' ability to think clearly about a situation will be contingent upon their ability to think scientifically; think philosophically; think morally; think historically; think aesthetically, and not upon their mastery of some superficial skills. More attention must be given to thinking about how this can be effectively achieved. This does not preclude engaging students in thinking about particular environmental issues; in fact, this will likely be important. In the name of education, however, this must *not* be done as a means to modify behavior or with the naive promise of solving problems.

We must recognize, as educators, that thinking is not a simple skill (McPeck, 1981; Barrow, 1987) but is inextricably linked to content. As we frequently observe, those who are best at thinking clearly about an issue are the people who have the most information. Content must, therefore, be selected both of its ability to develop in students the ability to think scientifically, morally, historically, aesthetically, and so on, as well as its utility in enabling students to thoughtfully consider issues of great importance to them. I believe that more attention needs to be given to arguing for the inclusion of environmental content into all fields of inquiry.

What this means to us, as concerned citizens and as educators, is that we must make clear and proper distinctions between our various roles in society. As citizens we must continue to advocate changes in social behavior towards the environment. Our quality of life, indeed our very survival, depends on it. As educators we must be sure that we are in fact educating. If our arguments made as citizens are sound, our students may accept them. If they are unacceptable, our students will have the ability to evaluate them as such, and the freedom to reject them. Environmental education will stand a greater chance of becoming more pervasive when it begins to stand on a more conceptually solid footing. This will require a clear distinction between 'education' and 'training' and between 'environmental education' and 'environmental advocacy'.

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TIMBER, FISH, AND WILDLIFE
A NEW APPROACH TO REGULATION OF FOREST PRACTICES

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Introduction

There are about 17.5 million acres of commercial forest land in Washington (Larson and Wadsworth, 1982), which forms the basis of one of Washington's largest industries. In 1984 the forest products industry contributed $9.6 billion (4.6%) to Washington's gross business income (Washington Department of Natural Resources, 1987). Furthermore, revenues derived from logging on state lands are major sources of money for schools and county governments.

Washington forests also support significant populations of economically, culturally and sociologically important fish and wildlife resources. For example, the average annual commercial catch of pacific salmon (Oncorhynchus spp.) in Washington is valued at $85 million (Ward and Hoines, 1986). Wildlife and other fish species are also important recreationally. Indeed Washington's fish and wildlife resources contribute greatly to the state's quality of life.

Unfortunately, forest practices such as road building and logging can damage or destroy fish and wildlife habitats and populations. Consequently, regulation of forest practices in Washington has been replete with conflict between the industry and environmental interests. This paper describes the history of forest practice regulation in Washington State, a negotiation process which led to a new approach to regulation, and the results of these negotiations as they relate to protection of Washington's fish and wildlife resources.

Regulation of Forest Practices in Washington

The State Forest Practices Act (FPA; Chapter 76.09, Revised Code of Washington (RCW)) of 1974 established a comprehensive statewide system for regulating forest practices on state and privately owned forest land. The intent of the FPA was to foster a sustained forest industry for the state while protecting fisheries, wildlife, water quality, recreation and scenic beauty.

As a result of the FPA, the 11 member Forest Practices Board was created as an agency of state government with representation from government, industry and general public. The Board was charged with adopting rules establishing minimum standards for forest practices.

Regulations adopted by the Board are administered and enforced by the Department of Natural Resources (DNR) in conjunction with other state agencies including the Washington Department of Fisheries (WDF), the Washington Department of Wildlife (WDW) and the Department of Ecology (DOE).

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Regulations to implement the FPA were first adopted by the Board in 1976 with water quality and reforestation the principle concerns.

However, because of their narrow focus on water quality, the regulations did not provide adequate protection of fish and wildlife habitats, especially in the riparian areas along streams, lakes, and ponds. These relatively narrow zones are critically important to salmon and trout (Everest et al, 1985). Further, riparian habitats are used by wildlife more extensively than any other habitat type (Oakley et al., 1985).

In response to these concerns, the Board and the DOE implemented studies for further clarifications of the issues (Sachet et al., 1979, Hobbs and Halbach, 1981). These studies led to some changes to the rules in 1982 but riparian zone protection was still inadequate.

In 1984, the Board commissioned further studies, one to examine cumulative effects of forest practices and the other to specifically identify the effects of forest practices on riparian zone habitats (Geppert et al, 1984; Riparian Habitat Technical Committee, 1985). Several workshops were convened to develop rules to address the findings of these studies. Because these rules, proposed in 1986, were much more protective of fish and wildlife, and more costly, industry protested rigorously. Not surprisingly fish and wildlife advocates still felt the rules were not restrictive enough. The Board, however, directed the preparation of an Environmental Impact Statement and Economic Study, due for completion in October, 1986.

The Negotiating Process

Dissatisfaction with the proposed regulations was not the only problem encountered in 1986. All interests were dissatisfied with the process for developing regulations. Environmental interests felt most Board members represented the industry interests. Industry leaders were disturbed by the lack of predictability in Board actions and continual "ratcheting down" of the rules with more restrictive language. The threat of lawsuit by treaty Indian Tribes was real. Rumors that industry was seeking legislative relief were rampant. The time was right for the parties in the dispute to devise regulations and other remedies that would afford a more equitable balance of resource use and protection.

Key leaders of the various agencies and interest groups approached the Northwest Renewable Resources Center (NRRC) for assistance. NRRC is a Seattle based non-profit corporation created in 1984 to resolve natural resource conflicts.

The NRRC agreed to facilitate negotiations between the opposing parties. In July 1986, the NRRC convened a 3 day meeting of over 40 state agency directors, Indian tribe chairpersons, corporate executives, environmental leaders and their technical representatives to determine if negotiation was feasible. Ground rules were agreed upon. Each interest had ample time to present their candid views and needs. Most importantly, listening was stressed: posturing and advocacy were set aside.

As a result, the participants found a surprising amount of agreement in principle on many issues. All parties agreed there was a real opportunity to negotiate how forest practices would occur in combination with regulation by the Board. Timber, Fish, and Wildlife (TFW) as adopted by the group as the name of the negotiating process and the resulting agreement.

TFW participants aimed to reach an agreement by November 1986 to forestall implementation of new rules scheduled for January 1987. This meant there were only 4 short months to resolve many complicated issues. But, with NRRC as facilitator, the negotiations began.

TFW participants formed two groups: The Working Group, with technical experts, and the Policy Group, or decision makers. The working group was further organized into committees to address specific issues, such as riparian zones, roads, unstable slopes, cultural and archeological sites. There was even a committee on attitudes.

The committees approached the issues by defining the problems, developing several options and selecting, if possible, a preferred alternative. Agreement was to be by consensus. Particularly difficult problems were taken by the committees to the Working Group for discussion and resolution, then passed to the Policy Group.

In August, the participants reported their progress to the Board, which supported the negotiation efforts and agreed to consider a TFW Agreement in their rule making. The November deadline was retained to keep momentum.

Following numerous intense meetings of the Working and Policy Groups, an Agreement in Principle was reached in December 1987. Following Board review and acceptance, final agreement was reached in January, 1987. Regulation which reflected the agreement were developed and adopted, effective January, 1988.

TFW Agreement

The TFW agreement consists of three principle components: (1) regulations, (2) cooperative/voluntary measures, and (3) adaptive management. The regulations provide minimum standards for roads, require retention of appropriate trees in riparian zones, and prompt reforestation. Operators are encouraged to propose specific methods to meet the intent of the rules. Interdisciplinary teams of specialists often visit sensitive priority sites to assess risks and develop alternatives. Landowners have voluntarily left undisturbed blocks of forest for wildlife habitat. Cooperative monitoring and research has begun and participants will adapt practices to the findings. Coordinated education and training of the participants and the public by the agencies, industry and state universities is an integral part of the agreement.

Summary

The TFW Agreement of 1987 marks a historic shift in the management of state and private forest lands in Washington. It provides a mechanism for all parties to resolve their differences in a non-adversarial, cooperative environment. Fish, wildlife, and water resource needs are equitably balanced against the needs of the forest industry.

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PROJECT FIELD: FRESH INSIGHTS FOR EDUCATIONAL DEVELOPMENT

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The need for teachers' professional development and updating is gaining recognition and action. Specifically targeted are science teachers because of the dynamic nature of their discipline which necessitates an ongoing updating process. One of the strategies of science instruction that is evidencing momentum but also has been nearly remiss in in-service training is the use of instruction conducted in the outdoor environment. Research findings suggest that the effective use of field instruction can influence student gains in cognitive, psychomotor, as well as affective domains (Fraser 1939; Evans 1950; Benz 1962; Kern & Carpenter 1986; Lisowski 1987). Field trips have provided students with a viable option to learning science and maximizing the potential for attitudinal and informational growth. However, to insure that this technique is utilized effectively, instruction in field trip methodology must be offered to teachers.

Project FIELD (Fresh Insights for Educational Leader Development) was developed to address this need by providing a field-based interdisciplinary science program for elementary and middle school teachers. It was funded through the Federal Education for Economic Security Act Program through the Illinois Board of Higher Education in collaboration with the Regional Service Center and Eastern Illinois University. Two graduate credits were awarded to the participants during the intense two week program.

Project FIELD had the teachers actively involved in investigating a variety of environmental conditions and sites for the extension of their own understanding of natural processes and so that they would be able to guide their students in learning about, in, and for the environment. The program consisted of field-based excursions, laboratory activities, curriculum planning sessions, and special lectures from community and university personnel. Community resource experts included the mayor, the conservation service, naturalists, quarry managers, and water quality inspectors. Site visits were made to several water sites and facilities, a recycling center, a quarry, and a natural preserve. Seminars conducted by university professors addressed ideas and concerns pertaining to the legalities of field trips, women environmentalists, Illinois geology, toxic waste disposal, and the learning cycle.

In addition to the emphasis on an interdisciplinary approach, science, technology and society concerns, and field instruction, attention was also directed to the implementation of the four Illinois State Goals for Learning in Science. All activities and experience were keyed to the state's four goals and their related knowledge and skills. Efforts were undertaken to adapt the activities to each teacher's local district's objectives, specific situation, and targeted grade level. As a continuation of the program, the teachers would be implementing within their school system some of the ideas and activities developed during the course. The teachers produced an activity manual and directory of resources for their classes and school districts.

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PLACING WILDLIFE REHABILITATION IN PERSPECTIVE

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Introduction

Human population growth and urbanization increase the potential both for interaction and conflict between people and wildlife. Conflict frequently results from competition for resources and living space, and often the wildlife suffers directly. Interaction with wildlife, however, frequently is viewed by the public as positive. Surveys conducted throughout the United States have consistently shown that Americans support wildlife issues, enjoy having wildlife around their homes and, most importantly, feel a need to do something to help wildlife. Attitude surveys also show that this same public tends to view wildlife not in terms of populations, but seeks to help individuals within the population. It is within this sociological framework that wildlife rehabilitation operates and expands.

Horton (1987) recently characterized wildlife rehabilitation in the United States. The purpose of this paper is to place the goals and objectives of wildlife rehabilitation in perspective with those of mainstream wildlife conservation education.

Wildlife Rehabilitation

For the purposes of this discussion, it is useful to define wildlife rehabilitation. Wildlife rehabilitation is an attempt to preserve the life of injured, sick or orphaned wildlife (i.e., animals that would not otherwise survive) with the goal of eventual rehabilitation and release back to natural habitats. As such, it is focused on a case-by-case, individual animal basis. But, the sphere of wildlife rehabilitation is more complex and multi-faceted, and we see both advantages and disadvantages in rehabilitation programs as they currently operate.

Advantages of Wildlife Rehabilitation Programs

(1) Provides the public with a place to take sick, injured and orphaned wildlife.
(2) Provides a humanistic/moralistic outlet for people to care for wildlife.
(3) Saves the lives of some animals and may result in the release of some back to the wild.
(4) May provide a source of unreleasable animals to be used for educational or research purposes.
(5) May promote preventive measures to discourage unnecessary harm/injury to wildlife.
(6) Provides non-domestic animal patients for training veterinary students.
(7) Rehabilitation of common species may further facilitate efforts with rare species.
(8) May provide important public relations benefits.
(9) May facilitate means to educate the public on a broader scope of wildlife issues.

Disadvantages of Wildlife Rehabilitation Programs

(1) It is extremely expensive to initiate and maintain a program; it is not cost effective as a means of wildlife management.
(2) The majority of species handled are common and those that are rehabilitated and released have no major positive impact (and perhaps even some negative impacts) on wild populations.
(3) Competition occurs for funds that could be used for other forms of wildlife management (e.g., habitat acquisition/management).
(4) Acclimation to people during rehabilitation may hinder success in the subsequent attempt to release the animal.
(5) The potential risk of disease (e.g., rabies, Salmonella, mange, roundworms) transmission frequently is great and may not receive adequate consideration.
(6) Rehabilitation work often becomes an emotional experience and may inhibit the ability of those involved to remain objective.
(7) Funding bases and staff frequently are inadequate.

Questionnaire and Discussion

In an effort to better understand the present status of wildlife rehabilitation in the United States, we developed a brief, 10-question survey and distributed it to 574 members of the National Wildlife Rehabilitators Association for their response. Our results are based on 307 completed questionnaires from members currently involved in wildlife rehabilitation.

As expected, the variety of answers was broad; we intend to concentrate on major results and trends. Rehabilitation centers were diverse, including schools of veterinary medicine, wildlife rescue centers, environmental education programs, humane and conservation foundations, zoos, an elementary school and many private individuals.

In response to a question about the types of wildlife typically rehabilitated, more than one-third indicated "all animals." Other groups frequently indicated were small birds, small mammals, and raptors. Few respondents indicated any interest in rehabilitating large mammals. In general, animals admitted for rehabilitation were not prioritized based on characteristics such as relative rarity or status in the wild. This generalization was valid regardless of the resource base of the rehabilitation program. Respondents seemed reluctant to put any "relative value" on animals brought to them and, therefore, most rehabilitation efforts were directed at species common in the wild.

Another survey question addressed the issue of whether rehabilitators used some selection procedure based on condition for admitting animals. About two-thirds of the respondents indicated that they did. Nearly one-third of programs that did not admit all animals (regardless of condition) indicated that truly hopeless animals were euthanized. Other factors that influenced admission were releasability (20%), status as an exotic (9%), and veterinarian opinion (8%). Few facilities made decisions based on the rarity of the species, competence of the rehabilitator, potential for disease transmission or availability of facilities. In general, large rehabilitation centers with paid staffs were more likely to avoid accepting all animals indiscriminately.

Our question regarding the primary objective for the animals at the rehabilitation facility yielded two frequent responses: (1) to rehabilitate for eventual release to the wild (63%), and (2) to save the animal's life (27%). Other infrequent primary objectives were: (3) to use for display/educational purposes, (4) to use for captive breeding, (5) to learn about the animal, and (6) to prevent suffering. Several respondents were dismayed that rehabilitation would be done for display and/or educational purposes.

A common problem with rehabilitated animals is their acclimation to people due to repeated exposure to human caretakers during the process (Olsen and Olsen 1980). Therefore, we asked wildlife rehabilitators if they attempted to avoid direct contact with animals intended for release. Although the question was answered by only about half (*n* = 163) of the active rehabilitators, the majority (74%) responded that such contact was avoided.

The majority (74%) of respondents also indicated that there was an educational program associated with their rehabilitation facility. This compares similarly with that (81%) found by Horton (1987). Descriptions of educational programs in our survey were greatly variable, but included public school interaction, interaction with natural resource organizations, facility tours, outreach programs and workshops.

When placing current wildlife rehabilitation efforts in perspective with wildlife conservation, we believe that it is important to understand both the broad variety of viewpoints held by the public toward wildlife and our current track record at educating these different publics about wildlife and wildlife habitats. Kellert (1980) described 10 general attitudes toward animals held by various segments of the public. Each of these 10 attitudes essentially constitutes a unique public sector. Therefore, conservation issues and activities likely will be perceived differently by each group as will the direction of educational efforts. Studies of Floridians (Duda 1987) have shown that the largest and fastest growing segment of the public, urban residents, tend to view wildlife from a humanistic and moralistic attitude. Specifically, their primary interest comes from a strong affection for individual animals (treating wildlife as pets) or from a strong concern for the moral treatment of animals (avoiding exploitation or cruelty). Duda's study also demonstrated that urban residents have the poorest knowledge of wildlife and their requirements.

Although the goal of most environmental education programs is to move the audience to a naturalistic or ecologistic attitude regarding wildlife, educators must be aware that much of their audience shares a markedly different viewpoint and may not be fully receptive to education programs that do not also address their current attitudes. We feel that conservation education programs too often avoid working closely with humanistic and/or moralistic groups because of differences in attitudes concerning wildlife. Effective wildlife education programs, however, must respect these differing viewpoints while maintaining the critical need to accurately increase the public's awareness and understanding of wildlife and their habitats.

We feel that wildlife rehabilitation centers provide a potentially effective, but poorly used mechanism for environmental educators to teach major segments of the public about wildlife. Rehabilitation work, almost by definition, is a greatly emotional activity. Injured, orphaned and helpless animals provide strong humanistic and moralistic appeals. Rehabilitation also is viewed by the public as a noble and moral endeavor, staffed by noble people. As such, rehabilitation centers draw respect and attention from a large segment of the public; those with humanistic and moralistic attitudes toward wildlife who wish to do something to help them. And these centers, through educational programs, have the potential to reach many people that traditional conservation education does not.

Rehabilitation centers provide many excellent "teachable moments" useful for public education. Animals are available for demonstration and their condition often elicits from the public both sympathy and a desire to understand. Although our survey indicates that rehabilitators do not consider rehabilitation-for-demonstration to be a high priority, using such animals could be an effective education tool by showing that humans can both help and harm wildlife. Using this then as a background, environmental educators could delve into broader conservation issues.

Results of our survey show that most rehabilitation centers provide some public education. However, our results also suggest that education is not a great priority, and we feel that the educational potential is vastly underutilized. Rehabilitators tend to focus their educational programs on goals and objectives in a different manner than mainstream environmental educators. Horton (1987) found that the most prevalent education objectives of rehabilitators were "to promote a greater appreciation and respect for wildlife" (85.3%) and "to share knowledge gained by wildlife experiences" (63.2%). Barely half responded that their objective was to increase "a better understanding of the environment" and far fewer indicated a desire "to implement research and management programs for the survival of wildlife" (30.9%). Due to the nature of rehabilitation, it is not surprising that their educational efforts tend to focus more on humanistic and moralistic than on naturalistic or ecologistic themes.

The above discussion is meant to highlight the need for environmental educators to become more involved with rehabilitation centers from an educational standpoint. Our survey results indicate that rehabilitators make a sincere effort to benefit the wildlife resource and teach the public on small and often insufficient budgets. Rehabilitation work is commitment-based not education-based, and rehabilitators rarely are trained as wildlife ecologists. Therefore, their educational efforts often may reflect attitudes that are more emotional than ecological, and ecological information that is disseminated may not always be factual. Rehabilitators' educational efforts also are not confined only to their direct public programs because the media frequently seeks information from them regarding wildlife issues. Environmental educators would do well to seek more interaction with rehabilitation centers that provide public education programs as both could potentially benefit from that involvement and a large segment of the public could be more effectively educated on wildlife issues.

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SAINT JOSEPH'S INDIAN SCHOOL RECREATION PROGRAM DEVELOPING AN ADVENTURE EDUCATION CURRICULUM WITH NATIVE AMERICAN STUDENTS

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Saint Joseph's Indian School, located in Chamberlain, South Dakota, is a residential child care and educational facility for approximately 200 Lakota (Sioux) children with a variety of special social and educational needs. A variety of programs and approaches are used at St. Joseph's to address these needs, including a child care program, an educational program, and a therapy-oriented recreation program. This program makes use of an Adventure Based Counseling program to achieve many of its goals.

As with any special population, Native Americans express a variety of special needs and characteristics that must be considered during program development. Unlike other special populations, however, nearly no research has been conducted on the characteristics appropriate for leisure-time programs and activities for this population. The majority of institutionally sponsored recreation programs for Native Americans, at least in South Dakota, are primarily diversional in nature. These programs generally employ athletics or other action intensive activities to keep participants occupied and give little attention to the needs expressed by the population they are meant to serve.

Prior to 1986, the leisure-time programs of St. Joseph's were no different than those described above. Due to a lack of funding, inexperienced and short-lived Recreation Directors, and a general lack of understanding on the part of all concerned as to the potential role of leisure-time activities in such a setting, the resulting program was primarily diversional in nature, limited in scope, and usually only met the needs of the residents by accident.

However, in 1986, it was determined to re-evaluate the programs offered by the Recreation Department, with the intention of updating these programs and making them more appropriate and therapy-oriented. It was felt that an improved recreation program, designed to offer needs based activities in support of the goals of other departments, could only improve the ability of Saint Joseph's to serve its residents.

Since no data concerning the programs of the Recreation Department had ever been collected, 1986 became a data collection and planning year. The collection of this data enabled the Recreation Department to develop an accurate picture of the current state of affairs for leisure-time programming at St. Joseph's.

This picture proved to be less than satisfactory. Essentially, it was determined that the department was providing primarily diversional, physical activity intensive programs, and very little purposeful, therapy-oriented activities that could be said to be supporting the goals of the organization. An overview of this program mix is presented below (Table 1.)

Table I.
1986 Recreation Program Mix
(Expressed by Activity Theme)

Theme	No. of Activities	% of Total Mix
Athletics	377	40.1
Physical Fitness	281	29.9
Youth Organizations	91	9.7
General Recreation	71	7.6
Arts and Crafts	64	6.8
Special Events	19	2.0
Env. Education	18	1.9
Misc.	18	1.9
Total	939	

As can be seen from this table, the program mix was seriously skewed. Two conclusions were drawn from this and other data: 1) the program mix needed to be adjusted to provide a more appropriate and diversified mix of activities, and 2) the way activities were being offered needed to be changed.

At this stage, the department faced three tasks. First, a general picture of the needs of the Native American population needed to be constructed. After this was obtained, programs that would meet these needs had to be selected, and finally, a coherent structure for the implementation, management, and evaluation of these programs needed to be constructed. These tasks were to prove more difficult to achieve than expected.

Surprisingly little information on the subject of recreation for Native American children has been collected. The Recreation Department was forced to attempt to develop this information on its own. An admittedly general, though sufficient, picture of resident needs was compiled by observation and by conducting interviews. In addition to these interviews, the department administered assessments to selected residents. These assessments were adapted from an assessment used by the Nebraska Center for Children and Youth to include cultural considerations, and included interest inventories, as well as attitude and preference sections.

A variety of "general" needs was determined to be prevalent among Saint Joseph's residents. These included items such as low self-esteem, low frustration tolerance, poorly developed socialization and communication skills, an unwillingness to accept responsibility, a lack of planning and decision making skills, a lack of awareness of leisure opportunities, problems dealing with racial prejudice, and an assortment of learning disabilities and emotional disturbances, many of which are caused or contributed to by unstable family backgrounds.

Once this general assessment of the needs of the residents had been compiled, the Recreation Department began to search for program ideas that would meet these needs. Again, little information is available concerning needs based recreational activities for Native Americans. However, information regarding needs based activities for other special populations is more available. After some searching, some basic program elements and resources were determined to be most appropriate and adaptable for the situation.

Now that these elements were in place, the Recreation Department began the formulation of a management structure with which to implement the necessary program changes. The Recreation Development Plan, a three-year plan for the development of the department, was written and granted administrative approval for implementation in 1987.

The Recreation Development Plan calls for several changes and program modifications. The cornerstone of these changes is the "Community Model of Recreation Management", under which Saint Joseph's is viewed as a small community, with the appropriate recreational assets and programs. The goals of this type of program management are therapy-oriented, focusing on assisting residents in becoming aware of the types of programs and opportunities that will be available to them after they leave the care of the organization, decreasing resident dependence on the institution, and supporting the Child Care Department in assisting residents in developing life skills needed for survival outside of Saint Joseph's.

Under the Community Model, all leisure-time programs are contained in one of three "service areas". These service areas are Community Recreation, Therapeutic Recreation, and Living Unit Recreation. The Community Recreation Service Area contains those programs and facilities that would, in a small community, be managed by public or private institutions of commercial operators. The Living Unit Recreation Program focuses on developing high-quality, purposeful leisure-time activities in the Living Units, with the department acting primarily as a resource agency for the child care workers.

The final service area, Therapeutic Recreation, contains those programs that have some type of therapy as the primary goal of the activity. Programs in this service area are conducted by the staff of the department for a specific group of students who exhibit the same or similar needs. It is in this area that the primary development of Adventure Based Counseling has taken place.

Adventure Based Counseling was selected as a major means of delivering therapy-oriented programs for several reasons. First, it has a proven track record, having been utilized and publicized by Project Adventure (the major source for resource material), Outward Bound, the Boy Scouts of America, and other organizations for at least fifteen years. The purpose of these programs, to increase the participant's sense of personal confidence, to increase mutual support within a group, to develop an increased level of agility and physical coordination, to develop an increased joy in one's physical self and in being with others, and to develop an increased familiarity and identification with the natural world (Project Adventure, 1974), seemed to address many of the needs that the department had determined as being expressed by the residents. Indeed, if used correctly, it was felt that such a program could be very effective in re-establishing positive links to traditional Lakota traditions and values.

Use of Adventure Education activities began in late 1987 with a three-day backpacking trip to the Black Hills. This trip involved seven students, and surprisingly, more females were involved than males. A group problem solving approach was utilized during this trip, the problem being how to get the group from the starting point to the ending point in three days. Preliminary training sessions, including outdoor skills training and trust and problem solving activities, were conducted for six weeks prior to the trip, and an evaluation session was held after returning to Saint Joseph's.

While no formalized testing was given, and while it is realized that a single activity is not sufficient to judge the merits of a program, it was felt by all involved that the activity was an unqualified success, and similar activities should be implemented in a more formalized fashion.

Currently, the department, now separate from the Child Care Department and known as Leisure Management, is in the process of implementing a year-round program of Adventure Based Counseling. By mid-October 1988, a twenty-two event "Challenge/Adventure" course will be in operation, comprised of many of the low-course obstacles found in Silver Bullets (Ronke, 1984) and Adventure Curriculum: Physical Education (Project Adventure, 1974). An indoor climbing wall is under consideration, and plans are being made for backpacking trips, day activities, and an assortment of outdoor skills training activities.

Prior to the implementation of these activities, the Department of Leisure Management plans to conduct testing using the Piers-Harris Children's Self Concept Scale (Lieberman and De Vos, 1982). The purpose of this testing will be to establish a baseline for later evaluation of the activity. The Piers-Harris was one of the primary evaluation instruments used by Project Adventure in early testing, and recent research with Native American children indicates that though there may be some questions as to exactly what the scale is measuring with Native American Children, it appears to be a fairly accurate measurement tool (Long and Hamlin, 1988), something that cannot be claimed for all testing tools used with this population.

A great deal of work remains to be done; however, continued data collection indicates that the program mix is shifting to a more appropriate level, and a wide variety of new program opportunities are being offered. The department plans to continue its present course, with the hope that the overall program will continue to become more therapy-oriented and culturally relevant.

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A CASE STUDY: THE INTERACTIVE ROUGE RIVER WATER QUALITY PROGRAM

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The Interactive Rouge River Water Quality Project arose out of a realization that the river had been abused and neglected for too long.

Friends of the Rouge, a nonprofit community organization, sponsored this project as an effective way to involve young people in a community problem, to mobilize media attention on the river and its issues, and to nurture concern and awareness in young people towards the river.

Students and educators from the University of Michigan's School of Natural Resources received funding from Friends of the Rouge through Ford Motor Company, the Michigan Department of Natural Resources (DNR) and the Kellogg Foundation to apply their knowledge and experience in designing and implementing this project into 32 schools within the Rouge River Watershed.

To help guide the project during its development and implementation, an advisory committee was formed. This group was composed of science and social studies curriculum coordinators, local science teachers, water resource professionals, and a representative from Friends of the Rouge. The committee was instrumental in recommending biology, chemistry, ecology, and earth science teachers who were interested in such a project. Criteria were also established by which interested prospective teachers would be selected to participate.

Day One: Orientation to the Watershed

The first day of the program was used by most schools as an orientation session. The classes reflected on the impact of water quality on their personal and community lives, showed a slide-tape presentation and video tape on the Rouge River, the boundaries of the Rouge River Watershed, and an orientation to the 15-day program.

Some schools chose to begin with the history of the Detroit area from the Native Americans to the French fur trappers and the settlement of the English.

Other schools collected benthic macroinvertebrates and placed them in aquaria in the classroom for observations and discussions.

Days Two, Three, and Four: Learning the meaning of each test and how to run the tests safely and accurately

These days were spent learning safe and accurate water quality testing. Small groups of students rotated through different water quality test stations modeled after a spring workshop. Typically, each student gained experience with all of the water quality parameters, but became an "expert" on at least one parameter. At each of the stations either a teacher or a resource person facilitated hands-on work with the test kits. In some schools, students who had run the tests previously were used as teacher's aides. Some advanced placement students also helped first-year science students in several of the schools.

It was essential for students to not only know the test procedures, but also to understand how parameters relate to other parameters within the Index and the significance of these measurements to aquatic life.

Day Five: Monitoring Day

Each school traveled to their monitoring site along the Rouge River. For some school this meant a walk to the back of the school property; for other schools a 25 minute bus ride across Detroit. Some of the monitoring sites were also DNR fixed monitoring stations. Groups of students ran dissolved oxygen, fecal coliform, pH, temperature, and nitrate tests. Water samples were collected to measure turbidity, total solids, and total phosphorus tests. The biochemical oxygen demand test was begun five days earlier, although an additional sample was taken on this day. Turbidity samples were transported to the University of Michigan and measured with a turbidimeter.

Day Six: Determining the Water Quality Index

With all of the data assembled, students recorded the data on the chalkboard, and the class derived a Water Quality Index (WQI) for their monitoring site. The Index is a single number representing overall water quality on that day and at that site. Some schools began graphing the water quality data and the Index in order to present it to other schools.

Students entered the raw water quality data and the calculated Water Quality Index into the Confer system and sent it to the other high schools monitoring on the same river branch. The significance of the WQI and of specific measurements in terms of public health were discussed.

Days Seven and Eight: Gathering information from the schools in the watershed and computer graphing

On the seventh day, students worked to take data sent to them by other schools on their river branch off of the computer. Graphing programs, such as Microsoft Chart, Cricket, and Graphworks were used to graph each water quality parameter and the WQI's along their branch of the river. When the WQI values were graphed, then students could see if the overall water quality of their branch declined. Water quality problem areas could also be identified in this way. Some students requested additional data or had questions about land usage upriver. These requests were entered onto Confer. Schools were asked for their explanation regarding particular values and for changes in parameters and in the Index values as one traveled downriver.

In addition to the Rouge River schools, schools in Australia (Murray River), India (Ganges River), West Germany (Rhine, Neckar, Mosel Rivers), Denver (Platte River), and Seattle (Deshutes River) were engaged in water quality monitoring programs modeled after the Rouge. These schools participated on another conference accessible to Rouge River schools through Confer.

Day Nine: Building skills to identify and define problems and their sources

The brainstorming activity was suggested for this day. In this case, brainstorming focused on possible water quality problems as reflected in the data and its sources. For example, if students prioritized water quality problems and noted that fecal coliform levels were very high, then they might suspect the combined sewer overflow as a major problem. Students from Kettering High School in Detroit monitored just below the outfall of the largest combined sewer overflow in the Rouge River watershed--the Hubbell-Southfield drain. Their fecal coliform measurements ranged from 15,000 colonies/100 ml. sample to 25,000 colonies/100 ml. sample. Two hundred colonies/100 ml. sample is the state standard for body contact.

The students were fairly certain that this large combined sewer overflow was the source. Other schools, even in the upper reaches, had high fecal coliform measurements indicating a combined sewer overflow.

Students at North Farmington High School located a malfunctioning pumping station along a small tributary of the Rouge River. They did this by noticing that fecal coliform levels were significantly higher below a pipe than above it. After bringing their information before the City Engineer, it was discovered that raw sewage was leaking into this tributary at the spot they suspected. This was corrected immediately.

Day Ten: Building skills to utilize information

It was suggested that classes take a water quality problem they had identified and the source of that problem and try to find out more about it. Where would you find more information about a particular development that is contributing to soil erosion? Who owns that drain upriver from your monitoring site? The students identified problems that they wanted further information about--where do you go for the answers? Who are the appropriate people to ask? Perhaps other schools know something about the problem.

This line of questioning also led to efforts to solve the problem. Using the Force Field Activity, classes asked what they would like to do about the problem, what they wanted to have happen, what were the resources to help solve the problem, who stood as a potential obstacle to solving this problem, and what possible actions could be taken on an individual and on a group level?

Day Eleven: Organizing information and discussing action strategies

This day was devoted to helping the student representatives to the Rouge River Student Congress present their water quality monitoring data in a clear fashion and to build a solid understanding of factors contributing to the data collected. To understand upriver factors more clearly often required communication through Confer to check out assumptions. Students needed to know the resources available to help them solve identified problems as well as potential obstacles. They needed to have in mind an action strategy coming into the Route River Student Congress.

Day Twelve: Rouge River Student Congress

On Saturday of the second week, nearly 270 students, teachers, resource people, administrators, and water resource professionals gathered at Martin Lüther King High School in Detroit for the Rouge River Student Congress. The students ran the event. They came prepared to share their water quality data with other students, to communicate identified water quality problems in their communities, and to generate recommendations for solving these problems along each branch. They engaged in participatory sessions designed to offer skills that could help them act on their understandings and commitments.

With a common purpose and a spirit of excitement, everybody introduced themselves. The students had much to share.

Later in the morning, students formed working groups with others of the same branch. Teachers met to review the program, and resource people were briefed about the afternoon workshops. Students from each of the 32 schools represented were placed into four major groupings -- Main Branch, Upper Branch, Middle Branch, and Lower Branch. In the student sessions, they discussed water quality data along their branch and offered their findings regarding problems of land use, individual behaviors, and economic pressures that likely contributed to declining water quality. Recommendations and strategies for confronting the problem emerged from these working groups. An outline of identified problems and recommendations was then presented to the entire Congress by each major group. Some recommendations presented were:

1) to restrict development in sensitive areas, particularly wetland and floodplain areas near the Rouge River and its tributaries;

2) to encourage increased media coverage of the Rouge River, its problems and potentials;

3) to begin recycling programs within the school and community, including motor oil, aluminum, newspapers, and other materials in the use of plastics and styrofoam; and,

4) to build greater support for cleaning up the Rouge River by educating students in elementary school.

Students and water resource professionals had the opportunity to ask questions of each other before the entire group.

During lunch, students signed up for a skill-building workshop to help them approach a specific set of problems. The workshops offered were:

1) radio/public service announcements (given by a student)
2) video production
3) community/school organizing
4) editorial writing
5) public hearing/remedial action plan
6) artwork/posters
7) communicating with legislators/local officials
8) street theatre

In each workshop were two or more facilitators experienced in that skill area. The purpose of these workshops was to expose students to a specific skill area so that the basic foundation for appropriate action would be in place when they returned to the school.

After lunch, students attended one of the skill-building workshops. In these workshops, students learned by doing. For example in the radio/public service announcement workshop students learned the principles of writing an announcement. They prepared public service announcements that were later read to all Congress participants.

The editorial writing workshop was led by a writer from the Detroit News and the public relations director for the International Joint Commission (a binational commission--U.S. and Canada--concerned with the Great Lakes). Students composed editorial pieces which were then printed by the school or community newspaper.

The poster workshop was led by a graphic artist. Students developed their own posters to hang in their school hall.

Students in the street theatre workshop produced a skit which was acted out before the group.

Each student participated, and the students took control over the course of the day. As the day ended, students were charged with reporting back to their classes what had occurred at the Congress and some specific actions which they could take as a class.

Days Thirteen, Fourteen, and Fifteen: Individual and group action

Student representatives to the Rouge River Student Congress reported back to their classes the experiences they had and the skills they thought could be brought to bear on problems important to the class.

Some students reflected on what they or their parents were doing at home--individual behaviors that could be eliminated or changed, such as helping the environment by choosing to speak out against a development; by riding a bike instead or driving; or by recycling aluminum, newspapers, and motor oil instead of throwing these in the garbage or down the sewer. Some students chose to continue monitoring for specific parameters in order to bring more attention to the problems that they discovered. This case study demonstrates the potential of education when it is focused on a community problem--one that impacts students' lives.

In just 15 days the young people in this project moved from a lack of understanding about the Rouge River and its problems to a deep understanding of the Rouge River. The freedom to explore problems in their community gave students in this project a sense of accomplishment--a feeling that they can affect change--or empowerment. That feeling permeated the Rouge River Student Congress and was not only felt by the students, but by the science teachers as well. The final result was that many students acted on the information and the understanding that they held--a good start towards building the citizenry needed to solve the complex problems of our world.

INTERCULTURAL COMMUNICATION OR WHY ARE YOU STANDING SO CLOSE?

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In order to set the stage for this workshop on intercultural communication, I would like each of you to have a short conversation with the person sitting next to you. However, this conversation will be a little different from conversations you have had in the past. You will be operating under communication rules which do not generally apply to people conversing in the United States. As you chat, keep these rules in mind. First, you are not permitted to look each other directly in the eyes. Second, nodding your head up and down indicates "no" and shaking your head from side to side means "yes". Finally, it is extremely rude to talk about the environment in any way, shape or form. Now, please stand up and meet your neighbor.

Did anyone feel strange trying to converse using these rules? Uncomfortable? Do you feel that you communicated as well as usual?

We are going to talk a little later about what just happened, but first I would like to present a rationale for intercultural communication education based on the relationship between humans and our environment. Maxwell (1983) divides the environment into three components--the natural environment consisting of weather, terrain, animals, plants and water; the built environment consisting of buildings and related artifacts; and the interpersonal environment consisting of people. The part of the environment created by humans and involved in interactions between humans is the focus of this workshop.

Cultural ecology, the study of the long-term impact of the environment on culture and of the corresponding human use of culture to adapt to our environment, argues that humans are a unique form of life because "we play an active role in our environment, while animals play an essentially passive role" (Kapland and Manners, 1972). Culture both creates humans and is created by humans.

While humans are the only animals who have culture and can use it to adapt to a variety of environments, we are also the only animals who have the power given to us by culture to radically disrupt the natural, built and interpersonal environments. Much attention has been focused on the often negative effects of science and technology on the earth's natural environment. As the same time, possibilities for radical disruptions in the interpersonal environment are also rooted in increased science and technology. For example, we now have expanded and improved transportation and communication systems. It was only three decades ago that the world's first artificial satellite was launched and the first jet service across the Atlantic Ocean was regularly scheduled. It is now possible to travel relatively quickly and comfortably to parts of the world nearly inaccessible a few years ago. Those of us who watched the recent summer Olympics in Seoul, Korea may not have even wondered how we could watch sports events occurring on the other side of the globe. For all of the developed and much of the developing world, transportation and communication are taken for granted. Interactions between members of diverse cultures has increased on a global scale as fewer and fewer obstacles exist to international migration and other travel.

Technology has also contributed to increased population. The sanitation of water supplies, public health services, and more efficient agricultural methods are just three factors contributing to population growth. The world's population passed the five billion mark this year. The World Bank estimates that by the year 2000 slightly over six billion people will be sharing the planet. The estimated hypothetical stationary population of the world according to World Bank projections is 11.5 billion with most of the population residing in less developed nations. China and India will have total populations of over one billion each and Nigeria will have over half a billion before the population growth ceases (Vu, 1983).

Competition for scarce land and resources combined with increased population means that more and more people migrate to cities. Technology has also contributed to urbanization in some countries as rural peoples lose their livelihoods to machines. Studies done with rates have shown that a number of social problems arise from overcrowding (Jacobson, 1979). In one study, thirty-two rats were introduced into a cage made up of four interconnecting pens. After one year, the rat population had grown to eighty and a number of pathologies had appeared. As the population grew, so did fighting, sexual deviancy, disorders during pregnancy, and even cannibalism. There is speculation that urbanization can cause similar pathologies in humans; however, there is not yet definite proof that such studies of rats are relevant to humans. A major difference between rats and humans is that we are intelligent and able to develop ways of dealing with such problems as overcrowding. Culture helps us to adapt to our environment better than rats and other animals. All ecosystems impose demands on the organisms living in them. Humans have adapted to such demands in the past through physical adaptation or natural selection (Maxwell, 1983). Changes in behavior help us to adapt to more short-term demands such as crowding. A major contribution to behavior change can be made by educating people to the effects of crowding, especially when that crowding encourages interaction between members of different cultures.

Finally, technology has increased militarization, especially the proliferation of nuclear arms, meaning that conflict which might have resulted in a few hundred or thousand dead a century ago could now mean the end of humanity as we know it, and even worse, the end of all life on the planet. While that may appear to be an overly negative forecast, there is no denying that widescale use of nuclear arms would disrupt all environments in a possibly irreparable manner.

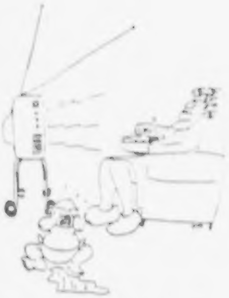
It should now be apparent that while science and technology are beneficial in many respects, they also place tremendous strains on the interpersonal as well as natural environments. Never has it been so imperative that people of all political, economic and cultural backgrounds learn to communicate and interact in such a way that international tensions are minimized and world peace promoted. While improved communication between people of different cultures is certainly not a panacea for all the world's problems, it can contribute to more positive interpersonal relationships and hopefully reduce some cross-cultural and international misunderstandings and tensions. At a minimum, a case could be made that intercultural communication education may reduce some of the stresses which result from increased migration, population and urbanization.

This finally brings us to the meat of today's workshop--intercultural communication. Before going any further, I would like to define the concept of culture. This is not as easy as it seems. Although most people have a vague understanding of culture, there are some 300 definitions published in the literature so far. The one I most like is "the learned patterns of thinking, feeling and behaving that make our lives meaningful". People have different cultures according to what we are taught are the correct ways to think, feel and behave. Culture is a dynamic, creative and continuous process which guides people in our struggle for survival. As children, we are forced to learn culturally appropriate values and behaviors through social institutions like the family and school. Adults internalize culture so much that we take it for granted unless something happens which forces us to reflect on it.

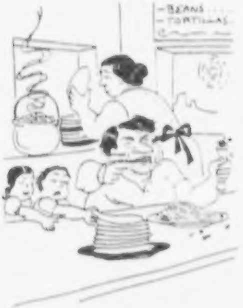
People may be culturally relative or ethnocentric. Ethnocentrics use their own culture by which to judge all other cultures; relativists strive to understand another peoples' behavior in terms of the context in which it occurs.

I would like to tell you about a conversation I had a few months ago with a new international student from Spain who had just arrived in Florida. She told me that as soon as she was informed that she had won a one year scholarship to study in Gainesville at the University of Florida, she went to the library of a North American cultural center in Madrid to try to find Gainesville on a world map. Much to her shock, the atlas she consulted had the American continent right in the middle of the map. After she expressed to me how conceited we North Americans are for putting America in such an important, central location, I asked her what was in the center of world maps made in Spain. "Why, Europe, of course." Then she turned red in the face as she realized she had just committed the same error of which she had accused North American map makers; that is, assuming their own country or continent is the focus of the world. Her own cultural background put world geography into a particular context.

An activity developed from drawings produced by the Latin American Studies Association (Williford, 1976; Nolan, 1988a) shows how our perceptions of other cultures result in certain images which then create stereotypes in our minds. Let's be as honest as possible and think about some of the stereotypes we think Latin Americans have of North Americans. Now, the opposite. What stereotypes do North Americans have about Latin Americans? Stereotypes, whether positive or negative, may influence our desire and ability to communicate with someone culturally unlike us. Recognizing stereotypes is a healthy step toward improving communication.



North American Women
Watch TV and Ignore
Their Responsibilities



In Latin America Everyone
Must Eat Beans and Tortillas

There is some confusion regarding the difference between intercultural and cross-cultural. The truth is that they are so similar that most people use them indiscriminately; however, they do vary in scope. Interpersonal communication which occurs on the individual level between members of distinctly different cultural groups is intercultural. An example would be communication between two participants of this workshop who happen to be members of different cultures. Cross cultural communication is a bit broader and may be defined as collective communication between cultural spokespersons of different cultures or between whole cultural groups (Prosser, 1978). Examples of cross-cultural communication are politicians or exchange students representing their nations.

The most obvious and immediate sign of a cultural difference in communication is verbal language. Languages are not necessarily determined by national boundaries. In Kenya, 48 languages are spoken. While standard English is spoken by the majority of the U.S. population, a large number speak dialects of English and others speak Spanish as a first or second language. There are now over eleven million persons of Latin American origin living on the mainland United States. In spite of so many Spanish speakers, for the Anglo population, Spanish is not a language of prestige. Students, when they study a language at all, will often opt for German or French over Spanish unless they live in an area where they recognize that Spanish may bring social and economic rewards such as in Miami. There is a strong tendency in the United States and in much of the world to glamorize languages spoken elsewhere while ignoring the importance of locally spoken languages. Since the focus of foreign language teaching is generally on its mechanics and not on developing communicative competence, students finish high school or college language courses able to conjugate verbs, but unable to communicate in the foreign language. As Senator Paul Simon has aptly put it, we should erect a sign at each port of entry saying "Welcome to the United States. We cannot speak your language" (Simon, 1988).

In spite of lack of apparent interest in the U.S. population to learn a foreign language, some people do manage to learn one or more foreign languages. However, learning a language is trickier than it seems. Cultural assumptions and contexts color language in such a way that we may believe we are communicating perfectly when we are not. Exact words translated from one language to another may have different connotations. For example, we all know that the Spanish word for "friend" is "amigo," yet when a Latin American says that someone is an amigo, does it mean the same as when a North American says someone is a friend? There are always exceptions to very cultural rule, but in general, when a Latin American speaks of a friend, that person is very special and may be a friend for life. In North America, we may refer to colleagues at work, classmates and even casual acquaintances as friends.

Another language difference arises when different words are used to mean the same thing. Last week I was driving a couple of Panamanian friends to a concert when I commented that we should stop and buy gas. I said "Tenemos que comprar gasolina ahora para no tener que compraria mas tarde." Comprar is "to buy." One of the Panamanians commented that my sentence was grammatically correct and understood, but sounded foreign because I should use the verb "ponter" which means "to put" instead of "comprar" or to buy. Later, I asked a Chilean friend if it was correct in Chile to say "poner" or "comprar" and he told me "comprar." He also said that in Chile, the word "gasolina" is not used. Chileans say "bencina" instead. So, Panamanians "ponen gasolina" and Chileans "compran 'bencina'"!

Senator Simon provides a number of examples of language difficulties in his book The Tongue-Tied American. An airline operating out of Brazil advertised that it had plush "rendezvous lounges" on its jets, unaware that in Portuguese, rendezvous implied a room for making love. Reader's Digest had problems trying to advertise Pepsi in the German version of its magazine. The German version of "Pepsi adds more to life" was "Come alive out of the grave" (Simon, 1988). It may or may not be news to you that the Chevy Nova did not sell well in Latin America since the name of the car sounds like "No va" or "Doesn't go."

This brings us to borrowing languages between countries. So many words have been borrowed between North and Latin America that we are sometimes confused as to which words are really of English origin or Spanish origin. Take a look at this list of words. Which are of English origin and which are of Spanish origin?

fiesta
bar
mitin
banana
pronto
jonron
siesta
bistec
yate
tortilla
patic
estraik
salsa
club
reportero
canyon
O.K.
queque
macho
tenis
coctel
rodeo
hippie
plaza

Words like bar, bistec (beef steak), club, tenis, mitin, yate (yacht), reportero, coctel, jonron (homerun), estraik (strike), queque (cake), O.K. and hippie are widely used and understood in Latin America, yet are all of English origin. The rest of the words are so commonly used in North America that we may not even notice they are Spanish words.

Cultural rules regarding behavior may also interfere with intercultural communication even when two people speak the same language. My roommate is from Kenya and receives a lot of telephone calls from other African students in the area. My custom upon answering the telephone is to say "hello" and then wait for the caller to identify him or herself and ask to speak to someone. Over and over again in the case of the African callers, I have said "hello," they have answered "hello" and nothing else. Since I am waiting for them to ask for my roommate or to say something, anything, there is dead silence for a few seconds until I say "do you want to speak with Nicki?" "Yes." I was a bit frustrated with these long silences, feeling that it just was not my responsibility to have to initiate the communication and guess what the caller wanted, especially when I was unsure with whom I was speaking. After conversing with my roommate and a friend from Uganda, I was able to realize that in some African countries, the person who answers the telephone is supposed to announce who he or she is and greet the caller. In Uganda, a person who knocks on your door expects you to greet him or her at the door, welcome you into the house and have you sitting inside before you actually have to speak more than a word or two. In other words, it is the responsibility of the person answering the telephone or the door to do the greeting and welcoming before the caller or visitor has to do much of anything.

It has been said that verbal language is only about 20 percent of communication. The rest is non-verbal. Non-verbal communication consists of factors as varied as gestures, facial expressions, smell and the use of time and space. While verbal communication is explicit and deliberate, non-verbal communication may be completely unconscious and unplanned. At time, verbal and non-verbal communication may contradict such as in the case when a person who appears to be angry because of posture, tone of voice and facial expression declares "I am not angry!" It is generally safer to believe non-verbal over verbal messages.

Much communication is done through body motions. Kinesics, the study of body motions, may be categorized into three types of gestures (Morain, 1978). Autistic gestures are nervous gestures made by individuals who are worried about something. These gestures are not strictly caused by culture. They include biting fingernails and tapping toes. Technical gestures are complex systems of communication which are taught to individuals in a culture. These include the sign language of the hearing impaired, military salutes and the gestures of umpires and traffic cops. The most common gestures are folk gestures which are the property of an entire culture and passed on by imitation. Pointing is a folk gesture and so is crossing the fingers for good luck and raising the right hand to swear the truth. A gesture understood to mean one thing in one culture may mean another elsewhere.

While learning a language facilitates verbal communication, learning the non-verbal communication of a culture is infinitely more challenging. In fact, people from countries in which the same language is spoken, i.e. the United States, Australia and Jamaica, may not have major language problems, but have misunderstandings based on different cultural rules and expectations. The example above about the African telephone callers illustrates this quite well.

Other communication situations based on culturally learned rules involve what Edward Hall calls "proxemics" (Hall, 1966). Proxemics refer to observations and theories regarding human use of space as it relates to culture. While most people believe that they have some personal space which goes beyond where their skin actually ends, that personal space varies by culture and is a major component in intercultural communication. Hall (1966) describes four distance zones among middle class North Americans within which certain types of activities occur with certain people. These zones may in turn be subdivided into close and far phases. The four types of zones, in order of increasing distance, are intimate, personal, social and public.

In the intimate distance, close phase, people are extremely close together, probably touching. Wrestlers, subway riders, parents with infants, and lovers may be found intimately close. At this distance, sight of each other is distorted, heat and breath is felt and smells are obvious. The voice is kept extremely low, probably at a whisper. The combination of sensory inputs combines "to signal unmistakable involvement with another body" (Hall, 1966). Intimate distance, far phase, is between six and eighteen inches. Physical contact is possible. Smell and heat may still be detected. While this is a typical distance for conversation in some cultures, North Americans find it is too close for comfort.

Personal distance, close phase, is one and a half to two and a half feet. This is what we consider to be our personal space in the United States. Close friends and family members may come into this personal space, but not strangers or other people unless there are circumstances which force people to violate personal space. Such circumstances include standing in line at a theater, learning close in order to hold a conversation at a noisy party, and riding in an elevator. Personal distance, far phase is "arm's length" or about two and a half to four feet away. This is the zone beyond which it is difficult to easily touch someone. It is in this zone that people in the United States feel comfortable chatting. Body smells and heat are usually not detected. People's faces appear to be of normal size and small details are still visible.

The zone beginning about four feet away and ending twelve feet away is the social distance zone. People usually deal with impersonal business at this distance and are somewhat formal. Some details of the physique begin to blur. The voice must be relatively loud in order to be heard clearly. People who do not want to be involved with each other may try to get into the outer limits of the social distance zone.

Finally, the public distance zone, is anything beyond twelve feet. At this distance, a person may take evasive or defensive action if threatened. The voice must be quite loud. People tend to select their words more carefully at this distance. The body tends to lose many of its details and to look flat instead of round. The color of the eyes is imperceivable.

One of the commonest observations made about intercultural communication regards acceptable distances for conversing. North Americans have a personal space of approximately two feet. The person who comes within that space uninvited may be seen as pushy or trying to be intimate. A complaint that North Americans make when someone enters their personal space is that they cannot properly see the person with whom they are conversing. They may have the sensation of being cross-eyed. I had the recent experience of encountering a Latin American friend in a public place and having him walk up to me and not stop until he was only one foot away. I did not mind the closeness nearly as much as I minded having to refocus my eyes in order to see his face. The short distance blocked my view of everything except his face. If I had not known about such things as culturally determined personal space, I would certainly have backed up, believing him to be a bit pushy. This business of personal space does not apply only to North and Latin Americans. A Ugandan friend told me that his Arab roommate was constantly backing him into walls! According to Hall (1966), as a general rule, Arabs have no concept of a private zone outside of the body and think nothing of leaning on even strangers in public areas.

An excellent way to learn about intercultural communication is through the study of critical incidents. Critical incidents are short scenarios of interactions between people of different cultures in which some sort of cultural conflict or misunderstanding arises. Readers are given a selection, usually four, of possible reasons for the intercultural problem and asked to choose the most probable reason. The following is a critical incident from a SAGE publication, Intercultural Interactions (Brislin, 1986).

> It was not long after John moved to Indonesia that he found himself in the company of two of his local acquaintances at a local marketplace. The older of the two Indonesians was named Soleh. After walking around for some time observing the local crafts and food items that were for sale, the men stopped for a few beers. The conversation swayed between such topics as aid to developing nations and the role of women in society. Just after initiating a discussion of local politics, John excused himself to go buy a round of beers, thus treating everyone at the table. He returned clenching three bottles in his right hand. While still holding the bottles, John suddenly remembered a point he wanted to stress with Soleh. Leaning forward and reaching for Soleh's shoulder with his hand before sitting down, he proceeded to talk. Soleh and his companion began to appear uncomfortable. The conversation began to move away from John. When the two finished their beer, they politely excused themselves and left. Neither made contact with John again.
>
> How can you explain the incident?

(1) Touching a person of the same sex is understood to mean a sexual advance in the local culture. Both men were put off by John's apparent advance.

(2) The left hand is considered unclean in some nations. There is a taboo against personal contact with it. Both Indonesian men were insulted.

(3) Soleh perceived John as flaunting his wealth by paying for the drinks. He was obviously insulted by John's purchase.

(4) Both men were insulted that John would get up and leave just after initiating a discussion. It is preferable to signal the waiter rather than leave your friends.

The correct answer is number two. There is a taboo about personal contact with the left hand in many nations of Asia and Africa. The left hand is considered hygienically unclean and should not contact either people or food. A similar reaction of people should be expected if one is seen eating with the left hand (Brislin, et. al, 1986).

During this workshop, we have talked about several activities designed to increase awareness of intercultural communication. All of these activities have been used during the past year by the Florida 4-H department. Most of the activities are found in the two 4-H guides, The Lively World of Intercultural Communication and Behind Our Eyes. 4-H is the youth education program of the Cooperative Extension Service conducted by the U.S. Department of Agriculture land grant universities and county governments and, with approximately five million members, is the largest youth organization in the United States. Members are both boys and girls ages 8 to 18. Members do projects on topics as varied at home economics, forestry, beef raising, computing and communications. The backbone of 4-H are 600,000 adult leaders nationwide who volunteer to work with young people and guide them as they do their projects. Because 4-H is tied to land grant universities, we have a research base to help us carry out programs and develop project materials. For this state, the land grant university is the University of Florida in Gainesville.

4-H or similar rural youth organizations exist in 82 countries although the names may vary. In Costa Rica, the organization is 4-S, in Italy it is 3-P and in Kenya and Scotland, it is Young Farmers Club. As a result of World War II and a determination to improve international understanding, exchanges have taken place among these countries since 1948. A total of 9,000 4-H'ers have traveled abroad representing the United States and over 22,000 rural youth from other countries have come to the United States and lived with 4-H families.

While National 4-H Council in Washington, D.C. and some states such as Michigan, Iowa, Minnesota and Washington have developed materials and exchange programs designed to promote cultural awareness, Florida 4-H had almost no involvement in international programs before 1986. International Programs of the Institute of Food and Agricultural Sciences decided to support the development of 4-H international programs by providing 4-H with enough funding to hire a graduate assistant on a part-time basis for one year to begin developing and coordinating international programs. We have been fortunate enough since then to obtain grants from the Kellogg Foundation, the National Association for Foreign Student Affairs and the Consortium for International Cooperation in Higher Education to help us develop materials and training programs. While it has not been easy to interest most County Agents, 4-H leaders and 4-H youth in this nontraditional program, results are finally being seen as more and more counties are deciding to use the materials and promote international programs locally. We had an intercultural training program last year involving 42 participants and hope to develop additional training programs for County Agents and 4-H leaders which will help them to feel more knowledgeable and confident in promoting intercultural education.

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NOTE: Additional information available from the author.

ENVIRONMENTAL AND SOCIAL PROBLEMS - A VICIOUS CIRCLE?

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Let us take the perspective of aliens from another planet who have come to analyze Earth's problems. Being unbiased newcomers, we will set up hearings with Earthlings from various walks of life and hear their opinions about the state of their planet. We will hear of poverty and inequities; religious and social malaise; pollution and habitat destruction; drug abuse and the presence of awesome weapons of destruction. As we listen to these and other problems, a question will probably occur to us: "are all these conditions unrelated and unique, or are they all linked in some way?" Could it be that these problems perpetuate themselves because Earthlings seek to solve each one separately?

This paper outlines a perspective on how various ills of our planet are interrelated. A major tenet set forth is that "we Earthlings" are involved in a "vicious circle" in which independent attempts to deal with social and environmental woes actually produce more of each. Empirical observations rather than scientific data will form the bulk of the support for this tenet. As biologist and philosopher Rene Dubos wrote:

> ". . .as presently managed, the scientific enterprise is too lopsided to allow science to be of much use in the conduct of human affairs. We have accumulated an immense body of knowledge about matter, and powerful techniques to control and exploit the external world. However, we are grossly ignorant of the effects likely to result from these manipulations." (Dubos 1968)

The "effects of our manipulations" may indeed by clouded by the tendency of science to break things down into artificial components.

What Is A Vicious Circle?

The best way to describe a vicious circle is to first examine its opposite: a "friendly circle" or negative feedback loop (Figure 1). An example of negative feedback is a thermostatically controlled temperature regime. Negative feedback loops are not human inventions, however. "Natural thermostats" have for eons detected excesses of temperature, gases, hormones, etc., and inhibited the sources of those excesses. A negative feedback loop, then, is a "process (that) automatically limits itself" (Arms and Camps 1979) and it represents a healthy, stable, and "friendly" condition.

If a negative feedback loop is "friendly," a positive feedback loop does not limit itself and is "vicious" (Figure 2). Webster's Dictionary (1981) defines a vicious circle as "a chain of events in which the solution of one difficulty creates a new problem involving increased difficulty." The difference between negative (friendly) and positive (vicious) feedback lies in the transfer of information between components of the system: the transfer is accurate in the former, and inaccurate (or even nonexistent) in the latter. Following are some examples of positive feedback that plague our society.

The Drug Problem

In recent years there has been an "unparalleled rise in illicit drug consumption" in our society (U.S. Department of Health and Human Services 1987), and reversing this trend has become a priority item. However, despite increased law enforcement efforts and "just say no" campaigns, the problem persists and worsens. Representative Charles B. Rangel (D-N.Y.), Chairman of the House Committee on Narcotics Abuse and Control, has written that "...we have ignored the root cause (of the drug problem)...the connection between drugs and hopelessness, helplessness and despair" (Leepson 1988). This, of course, prompts the question of how to defeat hopelessness and despair. Today's superficial answer of financial and material success through expanding economic development creates a vicious circle. The popular economic approach destroys and/or ignores human relationships and our natural surroundings which are more permanent and genuine sources of human well-being. As our human and natural resources are destroyed and ignored, hopelessness and despair - and drug abuse - increase. Rene Dubos (1968) observed:

> "we claim that human relationships and communion with nature are the ultimate source of happiness and beauty, yet we do not hesitate to spoil our surroundings and human associations for the sake of efficiency in acquiring power and wealth."

Consider the words of a recovering drug user:

> The drug's high would last for minutes; that of the woods has seen me sober for five years now. I praise the woods for having shown me a "hideout" unyielding to this one's folly. The people I have met here are mostly good and kind, as are the wild things. An overlooked prescription for illness of any kind is a stay in the woods" (anonymous).

Looked at in this perspective, the drug problem becomes, in large part, one of conservation and human relationships. Although some papers mention that drug abuse results from social and environmental factors (U.S. Department of Health and Human Services 1987) or cultural change (U.S. Department of Health and Human Services 1984), very little was said about developing interpersonal skills and nothing about using the natural environment for prevention or treatment of drug abuse in a selection of 7 books and pamphlets sent to the author by the National Clearinghouse for Alcohol and Drug Information.

Other Effects on the Human Spirit

Many other modern-day problems which affect the human spirit are part of vicious circles similar to that described for drug abuse. These include traffic congestion, sterile job routines, and stress in general. The popular solutions, such as more road building, construction of homes "out in the country," and rampant development to create jobs are all positive feedback

Pollution and Public Health

Pollution problems today are large-scale public health problems. Examples of severe water, air, and soil pollution, atmospheric changes, and food contamination are prolific and increase yearly. Our present attempts to deal with these problems involve us in a subtle but powerful vicious circle. Our most popular pollution solutions are "band-aids" such as smokestack scrubbers and ever-larger sewage treatment plants. These solutions act like an "open window" in the thermostat scenario (Figure 2A). They fool the "societal thermostat" into believing that pollutants are not causing the situation to "heat up." As a result, an overwhelming amount of pollutants continue to be produced because of excessive consumption. The "heater" is still on.

Public health solutions also fuel the vicious circle; not by what they are, but by what they are not. There should be a great deal of social commentary by health professionals concerning the effects of large-scale consumption on public health (as is done on a smaller scale with cigarettes).

The failed assumption that unlimited consumption can be mitigated by more technological advances must be questioned and rebuked. Public health problems due to excess consumption already exist and are unequally distributed to the poor and minorities of our country (Gibson 1988).

World Peace

Vicious circles fueled by excessive consumption are nowhere more important than in the threat of global nuclear war. Tensions and wars among human beings, like competition in the rest of natural order, are created by the "struggle for free energy" (Colorado State University notes 1982). A Biblical passage gives a similar view: "What causes war...among you?...You desire and do not have; so you kill. And you covet and cannot obtain; so you fight and wage war? (James 4:1-2). These words of wisdom suggest that to reduce the likelihood of war, we must resist the temptation to "keep up with the Joneses" and must reduce disparities between peoples. Increasing production and development (even in the spirit of cooperation) do little to reduce disparities, and instead fuel a vicious circle that results in environmental degradation and greater disparities.

Conclusion

In our society today, faulty (or non-existent) communication about excessive consumption and the basic needs of human beings maintains a large vicious circle in which we are all caught (Figure 3). Certainly there are other factors involved, but the "consumption factor" is perhaps the most important because it confuses the issue of human needs and is too often swept under the rug. People seem uncomfortable talking about the "consumption factor" because of unfounded fears about change and what less consumption would mean (no "progress," greater hardships, etc.). We need to put these myths aside, accept that change will occur (at a manageable pace if we start now), and take actions to break out of our vicious circle. Following are some steps toward accomplishing this:

1) In general, we need to consume less and purposefully address long-term human needs.

2) We should discover and relate to others how supposed "sacrifices" made for the environment can actually improve our lives (Table 1).

3) Environmentalists should become social workers. An important part of environmental education can and should be about less consumptive and more human-based lifestyle alternatives.

4) Social workers should become environmentalists. All social programs should take place within the long-term realities of our environment. Healthy relationships between people and between people and planet should be promoted as measures of success.

5) Religious, ethical, and philosophical aspects of life should be given more attention as they deal directly with human needs.

6) In general, discussion about the above issues should be encouraged - it is our ticket out of the vicious circle we are in.

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UNTANGLING THE WEB OF MANAGEMENT FUNCTIONS USING SPREADSHEETS

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While fulfilling our professional responsibilities, we are engaged in varying degrees with management functions: planning, organizing, staffing, directing, and controlling. Untangling this web of management functions can be consistently and effectively implemented through the use of the spreadsheet.

One factor common to all management functions is decision-making. The ability to make sound judgments and do problem solving analysis are key features that the spreadsheet performs well.

Whether your management tasks center around camp administration, park management, outdoor leadership or environmental education, the technological tool, the spreadsheet provides the flexibility to generate information on an assortment of input in order to make effective, qualitative decisions. The spreadsheet is a means of quantifying information systematically and consistently.

A statistical analysis of past and present needs for outdoor services, eco-systems, facilities, land and water uses can be plugged into the spreadsheets.

Logistics with the spreadsheet is quick and efficient. Meal planning for resident camps or expedition travel can be rearranged to handle any number of people or conditions and for special nutritional needs. When fund-raising campaigns are being planned, benefactors can be identified. Scenarios can be hypothesized and "what if" analysis can predict real life situations.

Directing programs, facilities, and people through complex schedules can be addressed using the spreadsheet.

Staffing resident camps and hiring part-time and full time qualified personnel can be quantitatively measured using a grid which lists job requirements and assigns values against potential candidate credentials.

Project planning, detail task analysis and assigned responsibilities can easily be updated to reflect start dates, target completion dates and actual project completion dates. Budget planning, measuring cost control against overspending, can help to regulate expenses.

A spreadsheet is an organized grid of columns and rows much like a piece of graph paper. Data is entered, stored, manipulated and retrieved by identifying the required coordinates, called CELLS. A cell can contain one item of data. Each cell has an address, a column letter and a row number (A1).

Different types of data can be stored in cells. Data is either a LABEL, a VALUE or a FORMULA. A LABEL includes text or combinations of text and numbers. A VALUE is a numnber. FORMULAS can be created to show the relationship of cells to each other. FORMULAS are instructions to tell a spreadsheet to perform calculations on the data stored in those cells which require numerical analysis. One formula can quickly be copied to other cells which require the same type of formulas. Information is updated automatically as the spreadsheet keeps track of what data is stored in which cell.

Computation of data follows the same principles of everyday mathematics. Formulas are created in such a way to reflect mathematical principles.

Spreadsheet users operate the spreadsheet through a series of choices that are made from different menus which are arranged in hierarchical order. Main menu selections include:

1. Worksheet Menu Selections
2. Range Menu Selections
3. File Menu Selections
4. Print Menu Selections
5. Graph Menu Selections
6. Data Menu Selections

From the Worksheet Menu, a user can adjust column width to the appropriate size, insert an extra column or row as needed, delete columns or rows, and erase the spreadsheet to start over again.

The Range Menu permits the user to deal with a specific section of the entire spreadsheet in order to center category classifications, or turn numbers into currency or percentages.

All spreadsheets are saved with a name and retrieved under the same name. The File Menu lets the user make these selections. Spreadsheets can be combined together to reflect new information.

To get a hard copy of the spreadsheet the selection is made from the Print Menu. The graph Menu allows a user to identify the type of graph to be plotted using data stored in the cells. Legends and scales can be created to make the graph easier to read.

As information needs to be extracted, the Data Menu permits the user to sort according to numerical or alphabetical indexing.

Using spreadsheets as a decision-making tool, a reporting tool and as a projection tool involves understanding concepts which are the foundation of all spreadsheets regardless of the company who provided the particular spreadsheet.

Concepts include:

1. Understanding how to set up column widths for data entry;
2. Formats for entering different classifications of data;
3. Menu selections;
4. Knowing how to use the features of showing relationships between cells through such things as writing formulas, using functions, searching and finding specified data, establishing models/templates for future use, and combining spreadsheets.
5. Using Format Commands to convert numbers to currency or percentages;
6. Generating graph based upon cell entry, and
7. Range selections, spreadsheet saving and printing.

Grasping these concepts can be applied to any spreadsheet to untangle the web of responsibilities involved with management functions of planning, organizing, staffing, directing and controlling.

Note: Additional information available from the author.

HOW TO MEET STATE REQUIREMENTS FOR STANDARD CURRICULUM THROUGH ENVIRONMENTAL INSTRUCTION

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The dilemma of reaching minimum requirements for a credential in a one-year post graduate program is common to many teacher training institutions. The need to prepare teachers in so short a time eliminates many enriched practical experiences that are more important to good pedagogy than the "essentials." Furthermore a teacher preparation program limited to the essentials of classroom management, phonics instruction and five-step lesson plans inhibits the professional growth involved in careful planning of instructional units to creatively meet the challenge of guiding pupils growth in thinking skills. Even the current emphasis on teaching thinking skills requires something significant about which to think.

The Department of Teacher Education at California State University, Hayward meets these requirements as completely as possible through a heavily-loaded student-teaching-centered program of three quarters. However, the second quarter includes methods for science, social studies and language arts, a perfect setting for planning and teaching interdisciplinary units. At the beginning of the quarter, while classroom placements are being finalized, the students experience a week or two of intensive workshops. During this time community agencies willingly present their curriculum materials.

The Pacific Gas and Electric Company puts on an energy conservation workshop which includes physical science and math skills. The students view a slide presentation on energy sources and conservation followed by some or all group activities such as mining the goodies out of a chocolate chip and nut cookie, then deciding what to do with the crumb tailings, leader demonstrations of making instant ice cream with liquid nitrogen and many small group activities with the materials in tubs. Thus they are learning management skills while they are accumulating a variety of lessons ready for immediate teaching. Finally, they file past an ample table of handout materials, so that they leave the room loaded with resources.

Project WILD and Project Learning Tree, two of the most comprehensive curriculum programs, are also presented by the community. The Hayward Area Recreation District hosts a Project WILD workshop and at the same time demonstrates good field techniques. The East Bay Municipal Utilities District provides ample materials on water conservation, and a Cal State alumnus who works for them volunteers an outstanding demonstration of the games and activities methods of modeling concepts through a workshop on Project Learning Tree. The Aquatic Supplement to Project WILD will be introduced at a shoreline site later this year.

Perhaps the most exciting introduction to interdisciplinary teaching of science and the importance of field trips presents itself in the field trip to Marine World Africa USA. Their education staff greets the student teachers at the gate to introduce them to the (Chevron) industry-sponsored education center where they are told about the kinds of experiences available to school groups and how to arrange for a field trip. Then the class is escorted through the theme park to observe school groups and to hear directly from the animal trainers about the habits and habitats of the animals and the great need for the conservation of habitat. The students have ample opportunity to question the animal trainers. At the end of the last field trip, the university instructor asked the student teachers to each come up with two questions to which the answer could be found on a trip to Marine World Africa USA. The two hundred different questions were then classified according to closed questions with only one correct answer, e.g. "How do whales and dolphins breathe?" and open questions with many acceptable answers, e.g. "What could our class do about the rain forest depletion?"

Does such infusion of environmental experience into the standard curriculum carry over into teaching practice? For an informal evaluation, these unsolicited comments have been extracted from letters written by the 1987 graduates for their own newsletter. "The other sixth grade teacher and I worked out a schedule where I taught science and social studies....Highlights of the year included outdoor school and our whale watching trip." "Go hug a tree for me." "I plan to teach a new elective class I've named "Nature Nuts". Each of the three terms during the year will have a different focus: Trees, Weeds, Seeds, and Me, Ants to Zebras and Habitat is Where It's At. The class will include an after school field trip probably once a week and plenty of activities from Project WILD and Learning Tree. Everyone knew I wouldn't be away from trees for long. While some kids have the teachers climbing walls, I hope to be a teacher who has the kids climbing the trees - well hugging them at least." "We don't talk about...Jason getting stuck up in a tree at the Oakland Museum." "If you are interested in nuclear waste disposal, drop me a line...This information would be great to include in a unit on teaching energy." The conclusion must be that legally mandated requirements for teachers and pupils can be met, even within the most stringent time constraints, through substituted, not supplementary, activities.

THE SOVIET NATURE PRESERVES (*ZAPOVEDNIKI*)
PROMISE AND PROBLEMS

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Soviet authorities have established a vast system of land protection and preservation. Although the imperatives of industrialization have made continuous demands on this system, it has survived and its future now seems assured. Expansion in the size and number of protected areas during the last decade reflects the growing concern among Soviet officials, scientists, and ordinary citizens about environmental problems. Environmental protection has reached the official policy agenda. The most recent indication of this policy shift is the creation of the USSR State Committee on Environmental Protection, a centralized super-agency with broad powers to monitor environmental pollution and to punish violators of anti-pollution laws. It will also coordinate and administer the far-flung system of protected areas.[1]

This paper will focus on a major type of protected land in the Soviet Union, the *zapovedniki* (plural for *zapovednik*) of nature preserves. Specifically, it will explore the place and role of the *zapovedniki* in the system of protected lands, their historical development, some persistent problems that threaten their effectiveness, and their promise as centers of environmental education.

The government of the USSR recognizes five major types of protected lands, which total about 36-million hectares, or close to 15 percent of the country's land mass,. The five types are: national parks, game reserves, *zakazniki* (plural for *zakaznik*) or temporary reserves, *zapovedniki*, and Biosphere preserves. Theoretically, *zapovedniki* are "territories withdrawn from economic utilization." National parks, the most recent additions to the system, include some preserved areas, but are primarily set aside for tourists and campers, in part so as to divert Soviet tourists from the *zapovedniki*. The national parks are mostly near the population centers west of the Urals, though one has been planned for the shores of magnificent but vulnerable Lake Baikal, "our glorious sea, the blue heart of Siberia." New and under-funded, the national parks are few in number and as yet not well organized. While the national parks are designed for tourists and campers, seven national game reserves and a number of smaller reserves in the union republics, serve the hunting clubs which have over a million members union-wide. *Zakazniki* cover the largest amount of land, some 25-million hectares, but are temporary serves, usually created to protect specific animal and plant populations. A *zakaznik* that grows in size and years may be elevated to the status of *zapovednik*.[2]

The *zapovedniki*, celebrated natural gems of the Soviet protected lands system, presently number about 140 and embrace about 11-million hectares. They are to be found in most of the major biogeographical regions of the USSR--the tundra, the taiga, the mixed-forest-transitional zones, the steppe, the desert, and the mountainous areas of the south. Twenty to thirty new preserves are planned for the future. The largest and newest nature preserves are east of the Urals, but the smaller, more established ones in the west are better administered. *Zapovedniki* are unique in the sense that they are set aside by the Soviet government almost exclusively for scientific study. Soviet ecologists and other biological scientists view them as ecological models, "standards of nature," by which human impacts on similar areas can be evaluated. Soviet scientists worry that many *zapovedniki* are too small to protect endangered species or to include fully the representative biosystem, and that some biotypes are not represented at all.[3]

Biosphere preserves are *zapovedniki* that have been recognized by UNESCO as part of the "Man and Biosphere" program of representative ecosystem types. The Biosphere preserves, such as the Central Chernozem Preserve near Kursk, preserve representative biomes and provide an area for scientific research. At present eight *zapovedniki* have been designated as Biosphere Preserves and six more are going through the nominating process.[4]

The *zapovedniki*, for all their promise, have experienced a troubled and uncertain history. In the fluid and rather more permissive years of the 1920s, Russian ecologists convinced Lenin and his associates to create the first Soviet nature preserves. (Conservationists and scientists had discussed the need for reserves before the revolution of 1917, but the disruptions of war, revolution, and civil war delayed their creation.) Notable among the ecologists who lobbied Lenin for the *zapovedniki* was Grigorii Aleksandrovich Kozhevnikov and his talented associate Vladimir Vladimirovich Stanchinskii, Russian pioneers in the study of community ecology. Kozhevnikov and Stanchinskii envisioned *zapovedniki* as research centers for ecological study. Preserves would be established in all the major biogeographical regions of the country, where they would serve as *etalony*, or standards by which scientists and policy-makers could judge the impact of economic exploitation on similar ecosystems. Heavily exploited areas could be restored, using the *etalon* as a model. For scientific and practical reasons, *zapovedniki*, as pure examples of nature, should be exempted from economic usage. These early ecologists were not primarily interested in preservation for the sake of preservation; they wanted to use the *zapovedniki* as scientific models, the study of which could in the long-run be useful to economic development.[5]

During the 1930s and 40s Stalin's ambitious plans to transform nature threatened the very existence of the *zapovedniki*. Stalin's biologists, led by Isai Tsrailovich Prezent, discredited the theories and plans of ecological visionaries like Kozhevnikov and Stanchinskii. All scientists must aid directly in Stalin's "Great Transformation of Nature." Soviet biology teachers taught their young charges that "there were no limits to biological productivity in nature or to nature's successful manipulation by humans."[6]

Stalin's economic ministers and planners pillaged the *zapovedniki* for natural resources. They reduced many of the preserves to farms for acclimatizing useful animals and plants. "The lamentable yet logical denouncement came....in 1951 with the liquidation of 85 percent of the protected territories of the USSR and their distribution to state farms and lumbering concerns."[7]

The preserve system recovered somewhat from Stalin's ecological tyranny but again, in 1961, it was reorganized and the number of preserves was reduced. Sixteen preserves were abolished including some that had been recently restored. "The activity of the reserves," noted three prominent

Soviet ecologists,"was simply viewed from the standpoint of providing for the needs of agriculture, forestry, and commercial hunting and trapping; their environmental-protection and research functions were largely ignored."[8]

During the last ten years the *zapovedniki* system has recovered, though many of the ecosystems that fell to the hammer and sickle of rank economic exploitation did not survive. Soviet scientists, meanwhile, have restored the original function of the preserves as centers of scientific research. A typical staff for a preserve includes twenty to thirty specialists, with their scientific assistants, several rangers, and an administrative support and operations staff--all led by a leading biological scientist. A preserve usually consists of a central core area of protection, open only to the scientists and their staff, surrounded by an outer buffer zone, which might be open to very limited economic activity, and perhaps even to tourism. Some preserves, for example the Barguzin Preserve on Lake Baikal, still serve as sources for economically useful animals such as sable.[9]

The scientists of the various *zapovedniki* form an impressive pressure group for the nature preserves and for the protection of nature in general. Their major program is simply put: preserve and expand the system of *zapovedniki*. They seek, with some success, to protect and to propagate endangered flora and fauna, such as Amur tigers in the Sikhote-Alin *zapovednik* of the Far East, and polar bears and snow geese on the Wrangel Island Preserve.

Soviet policy makers and scientists must still address some persistent problems, if the *zapovedniki* are to fulfill their promise as viable ecological models or as effective preserves for endangered species. Soviet scientists complain about poaching, lack of funding, disorganized scientific investigation, preserves too small to guarantee genetic diversity, pollution originating outside the preserves but threatening their ecosystems, and the ever-present possibility that some economic ministry will covet resources on the reserves.

Of particular concern to Soviet ecologists are possible fluctuations in the size of reserves, which would not only threaten genetic diversity, but also interfere with effective management and long-range scientific investigation. One recent Soviet study concluded that "the size and natural conditions of existing nature preserves and other protected areas with theoretical minimums show that what exists is clearly insufficient."[10] Only ten Soviet nature preserves, according to the authors, are large enough to maintain the genetic makeup of animal populations with losses of no more than one percent of any species per century. Something is better than nothing, they argue: "setting aside even a tiny 100-hectare reserve can....be vitally necessary for the future preservation of endangered invertebrates or rare plants." But they are concerned that the greater part of Soviet nature preserves can "neither provide a standard representation of the country's flora and fauna nor sustain the genetic diversity of living forms." And what Soviet authorities give they can easily take away, particularly during times of economic crisis. For, as these scientists remind Soviet conservationists, "the notion persists that nature preserves are areas lost to the national economy."[11]

The possibility that nature preserves may serve as schoolrooms and laboratories for environmental education poses a different set of promises and problems for the scientists who run them. A greater public awareness of environmental pollution, of habitat loss, and of ecological processes could bolster support for environmental protection and for the nature preserves in particular. Scientific study in the *zapovedniki*, moreover, provides the knowledge about ecosystems and of the human impact on the natural environment that must form the basis of any sound program of environmental education.

Already the *zapovedniki* are used by professors in the biological sciences for field trips to educate their students. To better acquaint the Soviet public with natural environments, the staff of many *zapovedniki* have organized nature museums, small zoos, and guided tours. Some *zapovedniki* have even opened their outer, buffer zones to a modest amount of tourism and outdoor recreation. However, many scientists fear that the Soviet public might love the *zapovedniki* to death. Affluence has increased tourism, just as heightened awareness of the natural environment has increased the desire to experience nature directly.[12]

The scientists who administer the preserves are thus caught in a serious dilemma. Public access could enhance the educational value of the preserves and increase pressure, in this era of *glasnost'*, on the government for environmental protection and the expansion of the protected areas. At the same time, a flood of tourists could threaten the very ecosystems that the scientists seek to protect. Many hope that the newly created national parks will attract tourists away from the *zapovedniki*. Others attempt to resolve the dilemma by prompting the Soviet authorities to expand the system of protected areas, but keep them closed to tourism, while they flood the Soviet public with television nature shows and richly appointed table-top books, complete with photographs depicting the splendors of the *zapovedniki*. Virtually all hope for a well-financed, unified system of administration which will fight their political and economic battles against the industrial ministries that pose the major threat to the future of protected areas in the Soviet Union. Unless that battle be fought and constantly won, the *zapovedniki* cannot serve as either research or educational centers.

Footnotes

1. Announcement of the creation and duties of the new Soviet Environmental Protection Agency in *Pravda* and *Izvestia*, 17 January 1988, pp. 1-2, translated in *The Current Digest of the Soviet Press* 40 (1988, No. 3): pp. 7-8. For a discussion of the history and role of the *zapovedniki*, see Phillip Pryde, *Conservation in the Soviet Union* (Cambridge: Cambridge University Press, 1972): pp. 45-67, as well as his more recent article, "Recent Trends in Preserved Natural Areas in the U.S.S.R." *Environmental Conservation* 4 (Autumn 1977, No. 3): pp. 173-177. *Zapovednik* literally means "forbidden area" in Russian.

2. See Kathleen Braden, "The Function of Nature Reserves in the Soviet Union," in Fred Singleton (Ed.) *Environmental Problems in the Soviet Union and Eastern Europe* (Boulder: Lynne Rienner Publishers, 1987): pp. 59-69, for a discussion of the functions of the reserves and an estimate of their total area. *Zakaznik* in Russian means "area set aside by law."

3. A useful reference to the *zapovedniki* is A.M. Borodin and E.E. Syroechkovskii, *Zapovedniki (Nature Reserves of the USSR: A Guide)* (Moscow: Lesnayua promyshlennost', 1984-85). An excellent introduction in English is Algirdas Knystautas, *The Natural History of the USSR* (New York: McGraw Hill Book Company, 1987); this book provides the first comprehensive look at the *zapovedniki* in English, with some spendid photographs. Knystautas is a Lithuanian photographer and naturalist who was given full access to the Soviet reserve system. A comprehensive inventory of nature preserves is provided in Dora Fischer, "Nature Reserves of the Soviet Union: An Inventory," *Soviet Geography: Review and Translation* 22 (1981, No. 8): pp. 500-552.

4. Phillip Pryde, "Biosphere Reserves in the Soviet Union," *Soviet Geography: Review and Translation* 25 (1984, No. 1): pp. 398-408, provides a brief introduction to the Biosphere preserves in the USSR.

5. This discussion of the early history of the nature preserves is based on the account of Douglas R. Weiner, "The Historical Origins of Soviet Environmentalism," *Environmental Review* 6 (1982, No. 2): pp. 42-62.

6. *Ibid*., p. 58

7. *Ibid*., p. 53

8. V.Ye. Sokolov and K.D. Zykov, "Problems of Nature-Reserve Work," *Prioroda (Nature)* (1983, No. 8): pp.32-33, translated in *The Current Digest of the Soviet Press* 35 (1983, No. 45): p. 14.

9. For useful reviews of the structure and function of reserves see Pryde, "Recent trends in Preserved Natural Areas in the USSR"; Braden, "The Function of Nature Reserves in the Soviet Union"; Fisher, "Nature Reserves of the Soviet Union: An Inventory"; and Knystautas, *The Natural History of the USSR.*

10. L.V. Alekseyeva, Yu. D. Nukhimovskaya, and N.F.Reimers, "Specially Protected Areas: Reality, Problems and Prospects," *Priroda (Nature)* (1983, No. 8); pp. 34-43, translated in *The Current Digest of the Soviet Press*, 35 (1983, No. 45): pp. 14-15.

11. *Ibid*., p. 15

12. For a brief discussion of the educational functions of the *zapovedniki*, see Braden, "The Function of Nature Reserves in the Soviet Union," and Knystautas, *The Natural History of the USSR*, p. 59. Little has been written on their educational potential.

A QUINCENTENNIAL FOCUS FOR ENVIRONMENTAL MANAGEMENT EDUCATION

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The impacts of the discovery of the New World on culture, natural resources, agriculture and the environment have been many and of enormous consequence. Cross-cultural interaction has included human and natural resources exploitation, species introduction and extinction, shifting patterns of agriculture and resource-use, and related cultural diversification. The changing interrelationships of resources with culture, and an ever changing quality of life from prediscovery to the present day, have resulted in a critical need for enhanced cross-cultural understanding of significant environmental management education concepts. In short, a program of Global Eco-Education is needed.

Historical Context

The Dominican Republic is a small country located in the Caribbean Sea. It occupies approximately the eastern two-thirds of the Hispaniola Island, the second largest island in the Antilles.

Over time, the natural resources of the country were used without any commitment toward the survival of future generations of the Dominican people. During this long period of Dominican history, natural resources were considered to be so abundant in comparison with the human population, that for many generations they were considered to be unlimited. As a consequence, no planning efforts for resource allocation were made.

This exploitation started with the colonization of Hispaniola Island by the Spanish in 1492. According to Wiarda and Kryzanek (1982), one of the main goals of the conquerors was to take back to the motherland as much richness as was possible. This initial period of natural resources exploitation continued until the early 1960s when laws and regulations that tended to systematically control the use of natural resources started to be introduced and approved by the Dominican Congress (SEA, 1985).

The Pre-Columbia era was apparently a time of tribal community on the Island of Hispaniola. Archeological evidence, what little that has been produced to date, would seem to indicate a rich and diverse culture that was closely tied to the land. The Taino indians were a primary aboriginal group and there numbers are estimated to have been variously between 150,000 and 380,000 by the time of the discovery (UNESCO-FNUAP, 1987).

In contrast, the impact of the discovery that is related to the transfer of the riches of Hispaniola to Spain initiated a pattern of exploitation that has been exacerbated over the succeeding years due to the continued population growth, political upheaval, a dictatorship, the normal impact of numerous hurricanes, and traditional slash and burn agriculture. The population is presently estimated to be over 6,000,000 with an average density of about 120 inhabitants per square kilometer (UNESCO-FNUAP, 1987). A growth rate of 2.6%

is presently being experienced with a birth rate of 45/1000, the highest for the Caribbean region. Such a growth rate yields a doubling of the population in 26 years. A look to the future reveals the likelihood of 10 million Dominicans by the year 2000 if present trends continue.

Today, much of the exploitation of natural resources has been linked mainly to small farmers, who subsist on plots of 2 to 2.5 acres on the hillsides of the country. Other segments of the population, traditionally linked with natural resources degradation, are charcoal makers and firewood gatherers (Morillo, 1986).

Exploitation of the land for subsistence is occurring on a regular basis. Charcoal production for fuel, the farming of steep slopes along with slash and burn agriculture, and concomitant reductions in farm size that would normally average 2.5 hectares in size on marginal or submarginal land are issues that must be addressed.

It is estimated that the national flora consists of about 5600 species of which about 36% are endemic. Preliminary listings indicate 277 plant species to be threatened or in imminent danger of extinction. The varied ecology and insular nature of the island has produced a small animal fauna that is quite endemic. Endangered of threatened fauna includes 6 turtle species, eleven reptiles, forty-four bird species and 9 mammal species. The introduction of the mongoose has all but depleted most native populations (Hartshorn, et al, 1981).

At the turn of the century the Dominican Republic was considered to be 100 percent forested, a figure which plummeted to 69% in 1946 and then to 16% by 1980. Erosion rates have been estimated at 300-1200 ton/HA/yr. as a result of the introduction of short cycle food crops. It is further estimated that the country has only about 20 years within which to establish sound natural resources management programs or face a level of human misery of catastrophic proportions (Kemph and Hernandez, 1987).

The Dominican Republic today faces serious challenges involving food, energy, and population, among others. These challenges have already caused substantial environmental degradation that may be viewed as a sign of warning for not only the future of natural resources but for the country as well (Hartshorn et. al, 1981). It can be further stated that "only a fundamentally and qualitatively different relationship between the Dominican people and the country's natural resources will enable the Dominican Republic to meet essential goals" (Ibid).

Attempts at Corrective Action

Since the early 1970s, programs of conservation of natural resources have been conducted in the Dominican Republic. Initially those programs did not include conservation education as a means of educating the majority of the population (Morillo, 1986). By 1972, the Organization of American States (OAS) formulated a regional project for forest resources management in which conservation education was identified as an immediate need (OAS, 1972).

Environmental Education was first introduced in the Dominican Republic after the Intergovernmental Conference on Environmental Education held by

UNESCO in 1977 in Tibilisi, USSR (Morillo, 1986). It started as a non-formal educational program in the Secretariat of Agriculture. The first goal of this program was to reach farmers working in small farm units with conservation messages trying to stop, or at least lessen, the current rate of natural resources degradation, with special emphasis being placed on soil erosion and deforestation. Those farmers are mostly concentrated in geographical units called watersheds (cuencas hidrograficas) and in areas designated as national parks.

The national school system has undertaken a few serious measures to introduce environmental education into the school curriculum in order to allow the students to become more aware of their local environments, aware of environmental problems, and to motivate them to actively participate in problem solving. Some training activities have been conducted in the school system since 1978, especially for in-service teachers through the combined efforts of the Secretariat of Agriculture, the National Zoo (including extensive teacher workshops with support of the World Wildlife Fund), and the Secretariat of Education. These training activities were conducted primarily to motivate individual teachers to introduce environmental activities in an informal way into their particular subject matters.

In August 1985, the Congress of the Dominican Republic approved Public Law 295, which heightened national interest in including natural resources and conservation in the program of the national education system. The approval of this law implied that the present scope of environmental education, mainly addressing farmer needs in a non-formal setting, will be extended in order to cover a broader proportion of the population, especially those in the school system. The implementation of this law will necessarily require the design of new educational programs and school materials to be used throughout the country.

A Natural Resources Management Project (NARMA) was implemented by the Dominican government with U.S. AID support in 1983 with institutional strengthening and field components and 16 separate but integrated activities, all focused on reversing the severe ecological and natural resources degradation of the country. The Environmental Management Education Project included: development of a comprehensive national plan for environmental management education; developing and implementing alternative communications strategies; and, the training of farmers, community leaders, agricultural technicians, teachers and students in environmental management concepts. Upon completion of the project in 1988 it can be observed that soil erosion in the target watersheds has been reduced by 80%, soil moisture has doubled, as has the amount of crop issues, and the workshops, radio, and school based programs and courses were successful (Morillo, 1986; Valdez, 1987; and Perez, 1987). Experience and data gained through the NARMA Project clearly indicates that as appropriate materials and strategies are put in place, the recipients will positively respond.

A Global Eco-Education Program

As a means of furthering cross-cultural understanding and providing perspective on the impact of the discovery of the New World on environmental quality, it is suggested that an Eco-Education bilingual curriculum development project be implemented that would produce a cadre of leadership personnel in the Dominican Republic and the U.S. that could initiate development of useful educational materials in the form of bilingual learning modules. A consortium for the implementation and evaluation of the proposed integrative bilingual curriculum modules could also emerge as a useful approach.

Specific goals would be to:

1. design, develop and produce a prototype Global Eco-Education Program for pre-service and in-service teachers to be field tested in the United States and in selected other countries; and

2. identify and incorporate selected principles and practices of human ecology and environmental management into the prototype Global Eco-Education Program as a means of focusing on the interactive and dependent linkages that exist between these two major global dimensions of the human condition.

The cross-cultural understanding of citizen decision making and concomitant environmental impact is becoming increasingly essential to the maintenance of the biosphere and the attainment of a quality life for all. There appears to be consensus among world leaders that the most pressing concerns for today's world include global peace and environmental quality (UNESCO-UNEP, 1988). Environmentally sound, sustainable development (ecodevelopment) is the procedure presently receiving substantial support. The UNEP report "Environmental Perspective to the Year 2000 and Beyond" and the Brundland Commission's "Our Common Future" have brought this pressing concern to world attention. The key to the achievement of the goal of ecodevelopment is the development of educators that are aware, knowledgeable, and skilled in ecodevelopment concepts, methodologies and understandings. This project could be a first but substantive step in that direction.

Purpose of the Workshops

The proposed workshops would bring together teachers from both the Dominican Republic and the United States to produce a cadre of leadership teacher personnel and develop cross-cultural and bilingual supplemental curriculum modules. These key teachers would initiate development of appropriate curricular materials, procedures, and techniques identified as important factors in effective instructional programs utilizing the Discovery of the New World and its impact on the Dominican Republic and United States (e.g. Columbus, Ohio) as the thematic focus.

Workshop Objectives

Specific objectives for the Workshops would be to:

1. Familiarize the leadership cadre with the research and background information on the historical, ecological, environmental and cultural characteristics from the five basic periods of Dominican Republic History (prediscovery to present);

2. Familiarize the leadership cadre with the research background information related to effective environmental management education, curricula and programs;

3. Identify major objectives associated with effective science, social science and integrative environmental management education programs, appropriate for the respective schools;

4. Initiate development of bilingual learning modules on concepts; and topics identified as important for cross-cultural understanding of the impact of the discovery of the New World on the Dominican Republic and the United States.

5. Identify and develop procedures for providing leadership in establishing and implementing effective environmental management education curricula in the respective schools.

The workshops could be conducted separately in year one of the project by the project staff in both Santa Domingo, Dominican Republic and Columbus, Ohio. Workshop participants should go on-site for a reciprocal workshop in year two, with Dominican teachers participating two weeks in Columbus, Ohio and U.S. teachers participating for two weeks in Santo Domingo and environs. In year three, both groups would again participate in their respective home countries for the evaluative phase of the project.

The model for Environmental Management Education utilized by Morillo (1986) in the Dominican Republic provides a useful illustration of the conceptual core and strategy for targeting appropriate audiences over time.

Consortium Network

The idea of networks, believing that schools should join with other schools that are endeavoring to change is the concept of a consortium network that could be of great importance to the successful planning, development, implementation and evaluation of the key elements of the proposed curriculum and training project.

A series of activities will need to be undertaken aimed at assuring rapid and continuous communications between and among key personnel in the Dominican Republic and the United States.

Specific consortial activities will include:

1. Identification of invited participants that are willing to participate and continue through to completion of the project;

2. Securing agreement from educational administrators to permit their teachers/students to be cooperators/participants with the project, on a sustained basis;

3. Establishing a microcomputer, electronic mail and FAX linkage capability between the co-principal investigator offices, INTEC in Santo Domingo and The Ohio State University, School of Natural Resources in Columbus, Ohio;

4. Acquisition of appropriate learning materials and micro-library development for the use of cooperating teachers in both the United States and Dominican settings;

5. Establishing appropriate communication linkages between and among participating educators and schools for sharing educational materials like: curricular modules; a newsletter; and targeted publications for specific user audiences.

Summary

That some materials, curricula, procedures, and conditions have been identified which have the potential for improving environmental instruction in school is clear. The identification of such factors, familiarization of participants with materials, adaptation for local conditions, and development of procedures for implementation of such materials and approaches forms the basis for the proposed workshop for leadership personnel.

The workshop could be a two-week program over a three year period aimed at bringing about close and continued contact among school personnel and educators from two major institutions of higher education. It is the intent that this format would foster the development of the support group. Formal instructional activities would assist the leadership cadre in developing a set of materials and procedures which they can take back to their own schools and use in their respective classes and in training of their peers in the skills needed to develop and implement an effective Eco-Education Program utilizing the Columbus Quincentennial as a focus.

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THE WOMEN ON THE SHORE: A PRELIMINARY INVESTIGATION OF THE LIVES OF WOMEN IN THREE FISHING COMMUNITIES IN ST. LUCIA

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Caribbean societies are inherently multicultural. The first inhabitants were Amerindians. Then came colonizers from France, Britain, Spain, Holland and Portugal; imported African slaves and East Indian indentured workers. These islands though small, have tremendous ecological diversity, geological differences and highly contrasting socio-economic conditions.

This study was based in St. Lucia. Here the influences are largely French and British, superimposed on an African population. East Indian sub-groups have inter-married extensively with the Africans. "Patois", a derivative of the French language, is spoken throughout the island, even though English is the official language. Roman Catholicism is the predominant religion.

Once a sugar producing island, St. Lucia's rich volcanic soils now support extensive banana cultivations. Most arable land is used to grow the bananas which are exported weekly to the European Economic Community. Tourism is developing rapidly in the north, close to the capital Castries. In the rural areas subsistence farming, artisanal fishing and indigenous handicraft are the main occupations.

The study focussed on Jean, Florence and Monica from Vieux Fort; Ticker, Clotilde and Cynthia from Savannes Ray and Edris, Marilyn and Jeanesta from Laborie. Indepth interviews and participant observation were used to compile their life histories.

The lives of these women were marked by ongoing struggle and an acceptance of high risks. Hardship for them, was almost taken for granted. The artisanal fishery in St. Lucia has not changed much since the days of the Caribs and Arawaks. Most of the fishing boats are little more than dug-out canoes made from the giant gommier trees which are felled in the inland rain forests and turned into fishing vessels locally. Sails are no longer used as most fishermen own outboard engines.

Clotilde vows never to settle down with a fisherman as she is afraid of reliving the anxieties that she saw her mother had over her husband's late returning from the sea. Each year, a few fishermen are lost at sea.

Most of these women had received sparse schooling. Childhood years were periods of hard work: growing, harvesting and boxing bananas for export, cultivating cassava and sweet potatoes, gathering coconuts for copra, making and selling charcoal or selling fish and other food, within the nearby villages.

The younger women in the group had received more education. For all, childbearing brought significant changes. Attitudes to contraceptives were negative. Some had been pregnant for some time without even realizing.

Monica ended a promising school career with pregnancy at fifteen. Cynthia entered an unhappy marriage with her two sons' father, sometime after the birth of the younger child. Jeanesta had to strap down her abdomen in order to conceal her pregnancy from her employers. After she had the child, the hotel owner refused to re-employ her.

Edris recalled the bitter years when her husband would hide part of his catch and give it to another woman with whom he had children, while she had nine of her own. Cynthia too, told of how when there was little food she endured the hard times without complaint but as soon as there was a surplus her husband would go and share their supplies with the mothers of his other children.

Jean remembered the outrage in the community when just after the birth of her second child, her husband returned from the neighboring island of St. Vincent with his son, from another woman. Jean agreed to raise this child also. Most of the women had to work to support their families or to supplement their men's unreliable incomes.

Food preparation was a common choice of work. Florence's restaurant served numerous patrons during the Second World War years when an American military base was established in Vieux Fort.

Edris, a baker, used her primitive wood-fuel stone oven to supply Laborie village with daily bread. Now, with her children grown up and qualified she only makes a batch of sweet coconut filled rolls called "turnovers", each day.

Jean operates a bar, lunch service and grocery. She is a leading member in the Vieux Fort Fishermen's Cooperative, wholesaling and retailing fish from her home. Florence, now widowed, once managed three fishing boats after her husband left her to return to the city.

At Savannes, Ticker is co-owner of a fishing boat with her husband and markets their catch daily. She also cuts and prepares the "bois mayenne" from the rain forest, which she uses to make fish traps. Her husband uses these to harvest fish on the offshore coral reefs. Other women who do not share in boat ownership help at the budding cooperative at Savannes, receiving fish in return.

Jeanesta of Laborie, after a series of low paid city jobs, began to make clothes for sale to tourists closer to home. When an exclusive resort replaced the former hotel, Jeanesta's trade was forbidden. For a while Jeanesta wholesaled and retailed fish; then she turned to purchasing local "sea moss" which she sold at a high price in the island of Trinidad. Recent surgery now prevents her from handling the hundred pound bags of sea moss at the airports of these islands. She is now negotiating a new venture.

Clotilde has opted for work in the Export Processing Zones. Wages are low, conditions of work stressful and cases of sexual exploitation have been reported. This work option is favoured by many younger women but when questioned, some admit to forgotten ambitions of further education leading to professional careers. Now, they cannot visualize any other work alternatives.

In contrast, there was Marilyn, the only woman whose academic success won her a place in the prestigious girls' secondary school in the city. She has become a qualified teacher. Now a Principal of a school near Laborie, she is unmarried, with one son. She explains that strict rules will necessitate her dismissal if she has another child without being married. Marilyn has been very active in an adult literacy program for fishermen and other interested villagers. She is also an executive member of the Laborie Fishermen's Cooperative. She has worked with the Cooperative to provide training for a small group of women to learn how to bone and fillet the "flying fish". The prepared fish can then be sold to local hotels for a good price. The women, who welcome this new form of employment complain, however, that the supply of flying fish is irregular and therefore they can only get a few days work each month. The Laborie Fishing Cooperative also has an experimental solar drying unit for fish and facilities to freeze the surplus catch. Marilyn's successes show the potential for achievement by St. Lucian women. Others, with training and opportunity, could also achieve in their respective fields. Marilyn represents the typical person who could facilitate such educational programs.

Low levels of literacy and the lack of training opportunities beyond or besides the formal school system are part of the women's plight. Attempts at local fishing cooperatives and agricultural trade unions have had limited success as a lack of cooperation and collaboration at the community level are limiting factors. The level of material poverty in some cases is extreme. Some homes have no pipe borne water or electricity and yet in one case, ironically, there was a television set powered by a car battery.

Prostitution, particularly in Vieux Fort, is prevalent. Locally produced alcohol is cheap and potent white rum which sells for just 25 cents per drink in Eastern Caribbean currency is favored by female alcoholics.

During my five week research period, a young mother drowned her two infants in the sea, allegedly on account of her financial situation.

But all of the women interviewed showed intelligence and insight, regardless of their formal education. Their responses revealed knowledge of customs, traditions and local natural resources. This traditional knowledge could become the basis of extensive environmental education. This could be used to communicate acceptable methods of exploiting natural resources, encouraging literacy and introducing new technologies for aquaculture, mariculture and basic food processing. Within the broader framework of environmental education the issues of pregnancy, family support and the quality of life desired could be explored.

The women tell a compelling story of harshness and sadness. Yet it is filled with potential, for they are characterized by a willingness and capacity for hard work. There is a desperate need for new directions among them through education that will eventually suggest new options and profitable alternatives.

This challenge can be met through sensitive, genuine collaboration at the local level, the generation of indigenous alternatives and the facilitation of a fully participatory approach. Environmental education in this context can be used as a channel for sustainable and balanced development.

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NATIVE AMERICAN ORAL TRADITION IN ENVIRONMENTAL EDUCATION: INSPIRING A LAND ETHIC

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Many environmental education programs, as well as school science programs, emphasize the teaching of information about the environment. The attention to details and to facts has the effect of keeping students at arm's length from nature by occupying their time with measuring and counting. During the ten year period, 1975-1985, in which I taught environmental education, I found myself doing fewer and fewer traditional measuring activities while incorporating more and more holistic and experiential activities into the curriculum. Many of these activities drew upon stories from the Native American oral tradition.

While we were directing our educational effort towards understanding the workings of the environment, we had failed, and are still failing, to introduce to our students an understanding of their being involved as a part of those workings. We have largely overlooked the importance of our relationship to nature, our sense of participating with it or as Aldo Leopold (1949) said our being a "citizen within the land community". It seemed that this feeling or sense of a relationship with nature, a human-to-land ethic, could best be introduced using literature from the Native American cultures. Their rich and diverse traditions have developed within the community of nature for thousands of years, and continue to do so. At the time of European contact, there were over 2,000 cultural groups exhibiting a wide diversity of customs and lifestyles, a plethora of values, beliefs and languages. It is from these dynamic cultures that a clear voice concerning an experience with the land has been coming into environmental education as well as modern environmental writing. The message of long term survival with the land comes from a diverse group of people who have lived for generations close to the earth with a "metaphysic of nature" as described by Brown (1985). It was their words, more so than any others, that were having a noticeable impact upon my students.

Most environmental issues are issues regarding our long term survival. The message in oral traditions is carried by a voice that has had great experience living with the land over the long term and has in turn been influenced by it. It is likely that the Native American voice we hear speaking for the land is the voice of the land itself. With regard to our long-term survival, an understanding of the Native American human-to-land ethic would benefit us all. By exposing ourselves and our students to ideas from other cultures, we can compare and contrast the Native American ideas with our own. This juxtaposition may act to broaden our understandings of diverse cultures as well as suggesting some ideas for improving our own human-to-land ethic and our long-term survivability.

In our search for a relearning of place within the natural community, we can also incorporate other lessons from the oral tradition. The literature's complexity or simplicity, thoughtfulness, rich description and humor are a part of the message for the ever wondering human. We must also exercise caution when using these stories so that we do not sacrifice a more complete understanding of the Native American lifestyle simply for our own benefit. For if we happen to better understand our place in Nature's community because of their teaching--we will owe them a great debt.

Within the context of the oral tradition one can "hear" the native peoples speak for themselves. By looking closely at the Native American human-to-land ethic, their dynamic and reciprocal relationship with nature and the proper role of humans as citizens of nature, as taught through the oral tradition, we can learn both about and from the Native American cultures. We can see and feel in the literature a close and morally responsible relationship with all components of the natural world.

I would encourage educators to share with their students stories from the Native American Oral Tradition. From these stories we can glimpse the many layers of meaning and relationship demonstrated by the oral literature. Astrov (1946) explains how the many skills of a storyteller contribute to a feelingful telling of the story and a more effective conveyance of the messages therein. Lopez (1978) describes the verbal art of storytelling as a way to reproduce the exterior harmony of the land in the individual's interior.

The Native American Oral Tradition demonstrates to young people that there is value in opening ourselves and our senses to nature, and in being able to frequent the wild places and spaces in order to be influenced by such teachers as the animals, rocks, thunderstorms, silences, sunsets and vistas. Through the use of Native American oral literature, environmental educators can rekindle imagination, inspiration and interest in a relationship with nature. The collective wisdom from the Native American sources tells us that we must, again, be respectfully conversant with the land if we are to continue to live on this earth.

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MOTIVATING RECYCLING BEHAVIOR: IMPLICATIONS FOR PUBLIC EDUCATION

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Images of the garbage barge from Islip, New York wandering from port to port in search of a place to dispose of its load flooded the media during the summer of 1987. The sight so captured the public's attention that the barge became a topic for Johnny Carson's monologues. The spectacular attention served to heighten awareness of what has become a problem nation-wide. It is estimated that more than 50% of the cities in the United States will have run out of room in their municipal landfills within the next two years (Brown, et al 1987).

With cries of a garbage crisis, various management strategies have been proposed. Solutions have ranged from burying the waste in English mine shafts to shooting it into space. However, some have suggested taking a less short term and dramatic perspective, proposing increased recycling.

Recycling has long been thought of as a method of conserving resources. For example, one ton of recycled newspaper saves seventeen trees. But now, recycling is also being seen as a way of conserving space in overcrowded landfills. On average, each North American generates nearly 1300 pounds of garbage a year, of which at least 100 pounds take the form of recyclable glass, with an additional 100 pounds in the form of newspaper. When one ton of newspapers (the amount generated by just 20 North Americans) is stacked, it reaches the height of a six story building.

Background

New Jersey instituted statewide mandatory recycling in April, 1987. The legislation requires communities to create recycling programs that will reduce their waste stream by at least 25%. The first county in New Jersey to institute mandatory recycling, Somerset County, initiated a pilot program in 1985. Mandatory recycling began in the county during September, 1987 (seven months before statewide mandatory recycling became effective). The county program required each of the 21 communities within Somerset County to develop a recycling plan utilizing either curbside pickup or drop-off centers. In addition, each program provides for the recycling of at least three materials such as aluminum cans, glass bottles, newspapers, and magazines. Recycling in the county has steadily increased, with rates climbing from an average of 200 tons per month in 1986 to 2000 tons per month in 1988.

As mandatory recycling was phased in, household participation rates increased dramatically. An estimated 47% of the households were recycling by the end of the first year of the program. But even with the power of legislative mandates, a vigorous public education program, and the implementation of support services such as curbside pick up of recyclables, full participation has not been achieved. The question becomes, what influences individuals to reduce their own production of garbage and to participate in a recycling program?

The Study

In an effort to increase recycling in Somerset County, it was decided that more information was needed concerning why residents currently participate in the recycling program, how they feel about it, what they recycle, and how they get their information about recycling. To understand more about recycling behavior a survey was developed in cooperation with the Somerset County Office of Recycling and Public Information. The 86-item survey included questions concerning the importance of a variety of potentially motivating forces such as peer pressure and the desire to be a role model, general concern about the environment and personal orientation toward the outdoors, the degree to which residents see solid waste as a personal issue and whether they feel an obligation to the future. Additional questions asked residents about their recycling behavior, the helpfulness of various sources of information about recycling and demographics. Of the 1500 surveys sent to a random sample of residents, 567 or approximately 38% of the surveys were returned.

The purpose of this paper is to outline the theoretical basis of the survey utilized in Somerset County by describing some of the forces that motivate behavior. In its simplest form the theoretical framework suggests that participation in a behavior such as recycling requires that people be both motivated to recycle as well as be willing and able to overcome barriers to recycling.

What Motivates People to Recycle?

There are a large variety of reasons why people may choose to participate in recycling programs. These vary from saving money to finding challenge in creating new ways to solve environmental problems. Each of these motivators may appeal to different people. Providing a mix of reasons for recycling is desirable in any public information program.

Many people have indicated that they participate in resource conservation activities because of basic underlying values towards the consumption and use of things (Simmons, Talbot, and Kaplan 1984-85; Simmons and Widmar 1986). The fact that their family always saved and reused materials such as jars, scrap wood, and nails because it was "the right thing to do" can be a significant motivating factor. Others might be motivated by the desire to live as simply as possible or by a sense of responsibility to help others (as when recycling programs are staffed by the disadvantaged).

Individuals may participate in recycling programs because they find challenge in discovering creative ways to live an environmentally responsible lifestyle. These may be people who are willing to experiment with new energy saving devices and otherwise spend time and thought in reducing the environmental impact of their day to day living.

Many will find economic motivations sufficient to justify the added effort necessary to carry out recycling on a long term basis. Motivation may come in the form of payments at recycling centers or more indirectly as a means of keeping their garbage disposal bills low.

Feeling a responsibility toward the future serves to motivate many people. Often there is a sense that future generations will be burdened unfairly by wasteful actions taken today unless we act to remedy the situation.

Additionally, people may find that a form of peer pressure, the fact that their neighbors recycle, the desire to fit in or the desire to be a role model to their children and neighbors, may provide other sources of motivation.

Unfortunately, it may not be possible to motivate everyone to voluntarily participate in a recycling program. Where the political will is strong enough, a mandatory recycling program will provide a motivation of last resort.

What types of barriers are there to recycling?

As with any behavior, motivation to act may not be enough. Without the knowledge of what to recycle or how those items can be recycled, recycling will not occur. Likewise, if recycling is considered to be too inconvenient or too time consuming, individuals may recycle only on a sporadic basis or not at all.

Individuals may hold positive environmental attitudes and find personal satisfaction from participation in many conservation-related behaviors, but if they feel that recycling is a token effort or that as one of four billion people their individual actions do not matter, they may not choose to recycle. The degree to which individuals feel that what they do can have a positive impact on the problem will influence the degree to which they participate in that behavior.

In what ways do people recycle?

In any recycling program people make choices concerning what to recycle and the frequency with which they recycle those items. Recycling and waste reduction behaviors go beyond bundled newspapers and aluminum cans to include composting, not buying objects that cannot be recycled, substituting reusable products for throw-aways, and buying, selling, and donating used goods.

How do we get people to recycle?

Recycling behavior is dependent upon people both being motivated to recycle and not feeling that there are significant barriers to their recycling activities. Recycling programs should consider each of these factors in designing strategies to increase participation. By identifying why people participate in recycling, public information programs can be built upon existing predispositions, helping people to make connections among those activities they already find satisfying (e.g. helping others, becoming more self-reliant) and their participation in the recycling program. Similarly, the identification of perceived barriers to recycling will help recycling promoters to target programs to reduce these impediments.

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HABITAT STEWARDSHIP FOR WILDLIFE PRESERVATION:
FLORIDA'S RELATION TO THE WORLD CONSERVATION STRATEGY

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> "The destruction of mangrove forests will remove a source of food input into an estuary and directly limited the production of detritus consumers ....This would reduce the populations of species which are of commercial and recreational value to man."
>
> William Odum, 1970

The Florida frontier changed little until this century. The immense coastline is longer than any other state's except for Alaska. Laced with rivers and swamps that account for the area's unmatched abundance of fish and birds, Florida from the time of its discovery in 1513 until today has lured the migrant, the itinerant and the dreamer with the hope of finding paradise amidst the sub-tropical splendor of vegetation and wildlife. No area of North America has been so densely populated in such a short period of time as Florida. With over 12 million residents today a new sense of urgency in understanding, protecting and enforcing conservation legislation is evident throughout the state. But the failure of adequate ecological conservation of Florida's fisheries, forests, wildlife, and resources stems from the incomprehensible variety of the region and the lack of any monumental scenery to galvanize national concern.

Early preservation efforts were focused on the territory's extensive oak forests required by the early nation's navy. Santa Rosa Island was protected as a forest reserve in 1828. It was almost a century later before this utilitarian strain was matched by a concern for the protection of birds. One of the earliest bird refuges was created on Pelican Island in central Florida by Theodore Roosevelt in 1905. By 1947 the first national park east of the Mississippi was located in the Florida everglades and the state legislature created the first submarine reserve in the 1950s on the east shore of Key Largo. Superficially at least Florida's landscape protection policies can be used to trace a slow evolution from the exploitation of natural resources for profit to the exaltation of wilderness for spiritual edification.

Beneath this apparent advance in understanding the sub-tropical ecology lies a disturbing pattern that remains unchanged. That pattern of exploitation can be seen readily by the fact that not one single barrier island on the Atlantic Coast remains wholly unspoiled by destructive water-front development. Dunes have been bulldozed and marshes drained in order to provide vacationers with access to Florida's beaches. There are no beaches in the everglades. In fact when the boundaries of the Park were finally agreed to in 1947, the mangrove forested Atlantic shore of the Florida keys were deliberately retained in private ownership.

Forests, particularly wet forests, are disappearing in Florida as they are worldwide. As wetland forests have retreated in the face of technological advances, those that remain in Florida pose a difficult set of issues for the evolution of our ideas about environmental conservation. The uses of cypress for wood and mangrove for charcoal once dictated forestry land-use practices in Florida. Today they are policed by wetland protection laws. Because clean water is fast disappearing from Florida's tree-lined lakes and rivers the protection afforded wetlands will be a continuing area of conflict between conservation and development advocates. Science and wastewater technology are making wetlands important to planners because of their alleged capacity to treat sewage. The cypress swamps, some advocate, possess an extremely high capacity to filter sewage. Florida will soon be awash in toxins and sewage unless considerable investments in garbage and wastewater technology are made quickly. The land, water, and resource needs of the nation's fourth most populous state reveals the ambivalent role that ecological science may play in the implementation and enforcement of conservation policies.

Today the pace of growth confronts Florida with numerous challenges that are beyond the capacity of the state's political economy. Instead of tax levies for education the state has chosen to run a lottery! Conservation of natural resources in such a political climate has been extremely difficult. With some of the finest land-use regulations among the states, Florida, after copying Oregon's statutes, has lacked the will to enforce, fund, and implement preservation laws. The real test of this generation's commitment to protecting the ecological diversity of Florida, however, can be best understood in relation to the United Nations ambitious policy: the world conservation strategy.

In an important sense, the world conservation strategy is a modern revision of the biblical responsibility of stewardship for the earth, but wildlife biologists are demanding more precise guides to forestall the loss of diversity. The urgency required for adopting and implementing a protective, international policy has been succinctly stated by Paul Ehrlich when he writes, "the very future of our society depends on whether Homo sapiens can learn to live without damaging the machinery of nature so seriously that it can no longer support civilization."[1]

The world conservation strategy was drafted by the International Union for the Conservation of Nature (IUCN) and the World Wildlife Fund in 1979 to forestall the ecological destruction of globally essential, life-sustaining systems and genetic diversity. This strategy's purpose is the "maintenance of essential ecological processes and life-support system, preservation of genetic diversity, and the sustainable utilization of species and ecosystems."[2] These first two tenets suggest that the ecological integrity of the biosphere is the necessary precondition for wildlife diversity. The life-support system of the biosphere is reflected by the functional integrity of certain significant habitats like rain forests, estuaries, or coral reefs. But some professionals have criticized the strategy as merely rhetorical due to science's relative ignorance about species' behavior and community ecology.

In order to make sense of the bewildering array of animals and plants in a food web, scientists rely on a smaller number of biotic indicators. These indicator species, it is alleged, reflect existing ecological conditions in different areas. Their relation to other creatures in the food web is essential to maintaining the functional integrity of critically necessary ecosystems. As an indicator of marine conditions the krill population of the Antarctic ocean are prey to whales, seals, and birds. Such key species reveal the health of their surroundings; the decline in the numbers of keystone species is an early indication that a habitat is threatened by intrusions. Any species may signify ecological conditions, but key species are used to gage the biotic community's functional integrity.

In Florida, key species such as the wood stork, everglades kite, and gopher tortoise show that threats to wild habitats come from a variety of sources. The common thread in habitat destruction is expanding human populations and increased per capita demands in many regions. The final tenet of the world conservation strategy asserts that the quality of human life rests on the ecologically integrated necessity of water, energy, air, and land. Because the strategy demands that future generations have rights to renewable resources, an enormous responsibility falls on the present generation to protect those habitats upon which the future health of human communities may depend.

Since the Stockholm Conference of 1972, conservationists have realized that maintaining wilderness demands a policy that also assures future generations a dependable share of resources. The principle elements of this global preservation policy currently guide the United Nations Environmental Programme's policies. Because the health or integrity of functionally necessary ecological support systems is manifest by a variety of plants and animals sharing the same locale, the amount of genetic diversity inherent in landscapes may serve as an effective monitor of human necessities.[3]

Florida's wildlife, unprecedented growth, and tropical ambience represent a significant case for understanding the limits and importance of the IUCN's world conservation strategy. For if a wealthy country cannot afford to protect the wild amenities which the global strategy suggests underpins our biotic and economic well being, then less developed nations must formulate more successful policies for wildlife diversity to persist.

Footnotes

1. Ehrlich, The Machinery of Nature, (New York: Simon and Schuster, 1986) p. 12; for additional discussion pp. 15, 18, 291. For a discussion of stewardship see: Ian G. Barbour, ed., Earth Might Be Fair: Reflections on Ethics, Religion and Ecology, (Englewood Cliffs: Prentice Hall, 1972) pp. 2, 4, 100-122. In a recent keynote address Ehrlich noted that "It's not easy for people to understand why the birds are declining here in North America because of the fragmentation of forests in Central America, but it's important for the ordinary citizen to become involved." He went on to blame the widespread ignorance on traditional education practices. Ehrlich suggested that "Our educational system is all wrong when it's possible to get through Stanford University without knowing where your food comes from." "Conference Log," California Waterfront Age, 3:2 (Spring: 1987), p. 6.

2. Lis Harris, "Brother Sun, Sister Moon," New Yorker, (April 28, 1987), p. 81.

3. Caldwell, International Environmental Politics, pp. 80, 272-273. Anne Blackburn, Pieces of the Global Puzzle, pp. 12-14, 18, 118, 140-141. Leopold, A Sand County Almanac, (1970), "Natural History," pp. 203-210. Paul Ehrlich also warns that "as we destroy the biota of the planet -- we all lose." Waterfront Age, (Spring, 1987), p. 6.

THE NAEE MINORITY ENTRY PROGRAM

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Problem

The Congressional Office of Technology Assessment in their June 1988 publication, **"Educating Scientists and Engineers: Grade School to Grade School"**, suggest that the national goals of maintaining and invigorating a productive science and engineering workforce demands efforts on three fronts. First, capable young people must be sought out and welcomed throughout the school years. Second, their individual talents must be nurtured by elementary and secondary schools and institutions of higher education. Third, they must perceive that there will be good fulfilling jobs available when they graduate.

Minority representation in the Environmental Science professions has been reported in a recent National Science Foundation study, Women and Minorities in Science and Engineering Professions from 1976-1986, to be 1% of all scientists in the nation. Blacks, Hispanics and Native Americans have had very spare opportunities to participate in nurturing and productive precollege environmental education training. The participating organizations of **"Environmental Education Movement"**, selected as their major mission the responsible leadership in effecting social change towards a quality of life desirable for all people.

Yet for two decades or more there has not been significant movement by many of these organizations effectively to involve the minority community in achieving this most appropriate goal.

NAEE's Response

The North American Association for Environmental Education has encouraged minority environmental educators and teachers to actively participate in the organization and on its Board of Directors. However, the problem of greater representation of minorities in the field of environmental education as a whole remains consistently low as indicated in the National Science Foundation report. To respond to this national issue the NAEE Committee on Minority Entry/Career Orientation was created in 1987 to work on the task of increasing minority representation and participation in the Association.

The long range goal of this Committee is to use NAEE's position as the world's largest environmental education organization to demonstrate to our colleagues the potential of this untapped resource and to inform the minority community of the relevance of careers in environmental education and environmental studies. The committee's charge is to seek small, discrete projects with specific, measurable outcomes as models for a larger and more comprehensive program in years to come.

Project

The first project proposed by the committee was the "Career Orientation and Internships in Environmental Education for Minority Youth 1988, a summer leadership internship program involving three NAEE affiliate organizations and six minority interns from New York City. The objectives of this project are 1. to provide real life experiences which may lead minority high school students to seek careers in environmental education or environmental studies; 2. to develop opportunities for NAEE individual members and affiliate organizations to benefit from participating in a structured minority outreach program; 3. to use the summer program as a possible model for expanded minority entry programs in the future.

Christadora Inc. of New York, a small foundation which has a major interest in minority youth education and environmental education provided the seed grant to implement a pilot project during the summer of 1988. Interns were selected based on their interest and previous experiences from a field of potential students referred by colleagues from the American Museum of Natural History, Wave Hill Environmental Education Center and the Manice Education Center. Each student interviewed had at least one camping or environmental education field study course offered through the feeder organizations prior to selection. Six young people were assigned two week internships, two interns at each site, at the Brukner Nature Center, Troy, Ohio, with Joan C. Heidelberg; the Florida 4-H Camps, Ocala, Florida with Clint Shepard; and the National Wildlife Federation, Washington, D.C., with Judy Braus. Each intern participated in various projects of the organization and were exposed to many diverse activities and opportunities to learn new skills and knowledge enhancing their understanding of possible career choices in the environmental sciences.

Evaluation

The evaluation of this program will occur on two levels:

1. Each host organization liaison person will produce a written review of their program which evaluates the interns adjustment to a new setting and their work performance.

2. A follow-up meeting will be held in New York City with all interns to learn whether their internship experience was inspiring and productive. A key component of the projects assessment process will be the participation of three interns at the NAEE annual conference in Orlando, Florida in October 1988. The students attendance will further extend their opportunity to become more knowledgeable about the environmental education networks.

3. We will attempt to maintain contact with all interns to monitor their progress and provide support and information on other internship and college placement opportunities.

Future

The long-term success of the NAEE Minority entry program agenda will depend on the commitment of individuals and organizations in the association and on the availability of funding from outside sources. The collaboration with national groups such as the National Urban Coalition, National Urban League, NAACP, Congressional Black Caucus Foundation, and others which have an interest in furthering minority youth achievement in the sciences. The NAEE Board of Directors is considering several long-term financial proposals which could enable the organization to take pilot projects beyond the first year. One strategy is to establish a minority entry fund using the interest from the NAEE Endowment Fund for related activities and the Minority Entry Committee to develop funding strategies as part of its annual work plan.

References

Educating Scientists and Engineers: Grade School to Grad School, The Office of Technology Assessment, U.S. Congress, Washington, D.C. 20510-8025, June 1988.

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HOW DO YOUR CONGRESSPERSONS VOTE?

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Introduction

For some years I have used data from the League of Conservation Voters (LCV) to help others gain reliable information on the environmental voting records of their senators and representatives, as well as those Congresspersons who have sought the office of President. This instruction has occurred in university and high school classes, and in workshops for educators and resource professionals. At the 1988 NAEE conference in Orlando, we examined data for: the delegations of four Southeastern states: 1988 Presidential hopefuls; Congress as a whole, by house, region, state, and party. Some of those data are presented in the present paper for illustrative purposes.

Every year or two, the non-partisan LCV publishes its tally of Congressional voting records. These show the votes of every senator and representative on about fifteen to thirty bills brought to the floor in the most recent session of Congress. Every Congressperson is also given a percentage score. One who always voted "for" environmental quality and sustainable energy on the selected bills would receive a score of 100; one who always voted "against" these goals would have a score of 0.

The bills are selected for their importance by LCV's board of directors, most of whom are drawn from a variety of respected conservation organizations, e.g. National Audubon Society, Natural Resources Defense Council, Izaak Walton League, etc. I am familiar with no other environmental voting analysis of this magnitude, or undertaken with such care, and I regard a several years' compilation of LCV scores to be a good indicator of environmental voting records.

In addition to the individual data for every one of our 535 senators and representatives, the League's report includes a summary page showing percentage scores by party, region, and state.

State Delegations

Congressional voting records for four states were compiled from LCV data and distributed to participants at the session. The states were Florida, Alabama, Georgia, and South Carolina--those having major cities within 500 highway miles of Orlando. The table for South Carolina is shown here (Table 1).

Table 1

THE SOUTH CAROLINA DELEGATION

PERSON. HOUSE. PARTY			1985/86	1984	1983/84	1983	1982	1981
Ernest Hollings	S	D	67	--	75	--	62	46
Strom Thurmond	S	R	8	--	5	--	15	13
Thomas Hartnett	H	R	24	16	--	15	21	36
Floyd Spence	H	R	21	34	--	29	21	21
Butler Derrick	H	D	75	57	--	88	80	68
Carroll Campbell	H	R	9	31	--	6	21	14
John Spratt	H	D	71	83	--	68	--	--
Robert Tallon	H	D	49	63	--	76	--	--

A few words of explanation. Going across the columns, it can be seen that Mr. Hollings is a senator and a Democrat, and that his LCV score in the 99th Congress (1985/86) was 67%, in the 98th Congress 75%, and so on. Note that LCV published combined 1983/84 scores for the Senate but separate 1983 and 1984 scores for the House, accounting for the blanks (--) in those columns. The blanks in the 1982 and 1981 columns result from Representatives Spratt and Tallon not having served in those years.

I typically have participants compute mean scores for each Congressperson, noting that is not mathematically correct to do so, since the individual scores are percentages representing different numbers of unlike observations, e.g. the Senate and House do not vote on all the same bills in a given year. Nevertheless, such means are reasonably valid indicators of a person's voting record over a period of years, and quite useful in the workshop or classroom setting.

A pronounced difference between parties is often noted by participants even before the computation of means, which then confirms this difference. In the South Carolina delegation, for example, the lowest Democratic mean is 62.5, for Hollings, while the highest for Republicans is 25.2, for Spence.

Congress As A Whole

Participants next examine the "Summary Analysis" page from the 1985/86 LCV report. There, they find that:

a) Nationally, Senate Democrats had an overall score of 64, Republicans 39. The House scores for the two parties were 64 and 31, respectively.

b) Regional differences are marked. New England scores were 79 in the Senate and 68 in the House, while the Rocky Mountain states were 27 and 33, respectively. Six other regions range between these, with Mid Atlantic, Mid West, and Far West distinctly higher than Southwest, Southeast, and Great Plains.

Possible explanations for these regional differences are elicited from participants, e.g. perceived pollution and crowding in the older industrial sections of the country, versus the perception of wide open spaces in the Mountain West. I often explain a second reason for the latter region -- its historical dependence on federal water projects and underpriced commercial access to the public lands. This point illustrates the principle that antienvironmental votes do not always represent fiscal conservatism, but often do represent Congress's traditional fondness for the pork barrel.

Presidential Hopefuls

Table 2, constructed from LCV data, shows all Congresspersons who in late 1987 had declared their candidacy, or were seriously considering running, for President. Upon examining it, participants find a party difference as great as that shown earlier for South Carolina, with the two Republicans averaging 23.2 and 24.8, and the lowest Democrat at 68.5.

Table 2

CONGRESSIONAL PRESIDENTIAL HOPEFULS, 1987

PERSON, HOUSE, PARTY, & STATE				1985/86	1984	1983/84	1983	1982	1981
Joseph Biden	S	D	DE	86	--	94	--	74	99
Robert Dole	S	R	KS	35	--	22	--	23	13
R. Gephardt	H	D	MO	74	78	--	76	59	68
Albert Gore	S	D	TN	67	--	--	79	71	57
Gary Hart	S	D	CO	81	--	75	--	66	72
Jack Kemp	H	R	NY	3	30	--	23	40	28
Pat Schroeder	H	D	CO	100	86	--	84	95	91
Paul Simon	S	D	IL	83	--	--	76	83	65

Senators Gore and Simon were members of the House, 1981-1984.

Table 2 does not, of course, include candidates who were not members of Congress: Babbitt, Bush, Dukakis, du Pont, Haig, Jackson, and Robertson. In addition to its Congressional voting reports, LCV publishes a quadrennial rating of all the candidates. This analysis uses various types of data and is necessarily more subjective than the scores in the tables above. In the 1988 analysis, published in March, the individual overall letter grades for the Democratic hopefuls ranged from C+ to B+, and for the Republicans from F to D+. At this point, it may be worth repeating that the League is a non-partisan group, and it endorses selected Congressional candidates of both parties.

As to the two candidates who still remain in the Fall of 1988, Bush received a D+ and Dukakis a B. Vice Presidential candidates Quayle and Bentsen both served in the Senate throughout the 1980s, and so voting records are available for them. In the period 1981-1986, Quayle's scores ranged from 25 to 56, Bentsen's 19 to 60; their means were 40 and 39, respectively. Here, party differences seem to be overshadowed by regional ones, and by the effort of presidential candidates to balance the ticket when selecting a running mate. It may be noted that in the same years that Senator Bentsen's scores ranged from 19 to 60, those of his Texas Republican counterparts, Tower and then Gramm, ranged from 0 to 17.

Conclusion

In workshops and especially in the classroom, I explain both party philosophies in strictly positive terms. These data speak for themselves, however, and are a real revelation to many participants and students.

Note: Additional information is available from the author.

LEOPOLD, GARY, CHARDIN, AND THE VISION OF ETHICAL EVOLUTION

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Introduction

In his well known essay "The Land Ethic," Aldo Leopold proposed an ethical sequence in human evolution. In the present paper I discuss the idea as it is found in two other works: Leopold's "Conservation Esthetic" and Romain Gary's now neglected novel The Roots of Heaven, with its subtle use of Teilhard de Chardin as the fictitious Father Tassin. I conclude with some caveats.

The Leopold Essays

Most environmental educators are familiar with Leopold's life and work to a greater or lesser degree. Hunter, adventurer, forester, philosopher, naturalist, political activist, founder of modern wildlife management, and extraordinary craftsman of the written word, he is regarded by many as the intellectual father of the environmental movement which began two decades after his untimely death.

It will be remembered that in his best known essay, he posited that an ethical sequence has evolved in western thought. The first ethics defined right behavior between individuals; the Ten Commandments is a codification of such ethics. The second ethics defined right behavior between individual and society; the Constitution codified this ethical system for Americans. Leopold argues that there is as yet no ethic defining right behavior between humans and land, and certainly no comparable codification of it. (By "land," Leopold means not only soil, rocks, and water, but the community of organisms which live above, beneath, and in them.) Land is still regarded as property, and our relationship to it is one which entails privilege without obligation. For Leopold, the extension of ethics to ever-larger human communities--village, nation-state, globe--has been an ecological evolution necessitated by population growth and changing technology. The next stage of this evolution, ethical behavior toward non-human members of the community, is for him "an evolutionary possibility and an ecological necessity."

Alamanac's final essay, "Conservation Esthetic," has attracted less scrutiny than "The Land Ethic," but it further elucidates Leopold's ideas about human evolution. In "Esthetic" he proposes a taxonomy of human relationships to land, progressing from trophy hunting at the lowest esthetic and evolutionary level to husbandry at the highest. A hunter himself, Leopold would not have been a member of today's anti-hunting forces. Rather, he argues that many of the most ardent conservationists and land stewards began as hunters and anglers in their youth, an assertion supported by some of my own research. But their continued intimacy with the land moved them to the higher relationships which he calls isolation, perception, and finally husbandry, by which time some (not he) will have completely abandoned the hunter stage. He evokes evolutionary theory inciting the biologist's dictum that Ontogeny Recapitulates Phylogeny, i.e. the history of the individual mimics that of the species. As embryos we first resemble protozoans, later fishes. To Leopold, the youthful hunter resembles the cave man, and many outgrow this stage. The adult trophy hunter is a case of arrested development. This idea leads naturally and directly to Romain Gary's novel.

The Roots of Heaven

Like Leopold, Romain Gary led a seemingly hyperactive life. Attorney, diplomat, war hero winner of the Croix de Guerre, novelist who won both the Prix de Critiques and the Prix Goncourt, literary hoaxer who won a second Goncourt under an assumed name, he was also a tragic figure, an innocent victim of the ruthless J. Edgar Hoover, and a suicide.

The Roots of Heaven, published in 1958, won Gary his first Goncourt and became a John Huston film which was fine, noble, and ignored. (The other Goncourt winner, Momo, became a film which won the Academy Award as best foreign-language film.)

The plot of Roots is easily summarized. Morel is a Frenchman living in postwar colonial Chad. As a prisoner of the Nazis he had kept himself alive by dreaming of the freedom of elephants. Now, appalled at the annual slaughter of 30,000 of their number, he circulates petitions and pleads with politicians. Eventually this idealist realizes that legal procedures are useless, and he takes bolder steps. Retreating to the bush with a small band of followers, me makes direct war on his enemies. A poacher is thrashed, an ivory dealer publicly flogged, a famous female trophy hunter publicly spanked, a collector for zoos shot in the posterior. (Morel aims his rifle carefully. "You never teach a man anything by killing him," he pronounces.) As his fame grows, so does his Robin Hood band, as the famous and infamous are drawn to his side from the world over. Near the end there is an all-out shooting war; at the end he staggers on with the remainder of his little army.

For me, Roots is many things. Accurate prophecy about the plight of the African elephant. Profound early statement of the environmental world view. Fine adventure yarn. Grand character study of the diverse types who align themselves with or against the protagonist. Finally, it is a superbly subtle statement of the evolutionary theory advanced earlier by Leopold.

The subtlety resides in Gary's use of the story-within-a-story technique, in which the tale is told to a Jesuit named Tassin. This Tassin is a paleontologist digging for fossils in the African bush, a priest whose heretical ideas make the Vatican all too happy to have him thus exiled, a thinker whose only correspondents are a "half-dozen men whose names (are) like beacons in the darkness of the century." The old Jesuit is tall, angular, hard-muscled, with thin lips softened by compassion, "narrow eyes and great bony nose," and "the profile of a Breton sailor accustomed to watching the horizon." Clearly the Jesuit is Teilhard de Chardin, right down to the physical description.

I do not know whether Gary was the first novelist to use Chardin as a rather significant character. He is Father Telemond in Morris West's The Shoes of the Fisherman, 1963, and Father Merrin, the title character of The Exorcist, 1971, by William Blatty. There are probably other examples unknown to me, or which I've forgotten. In Roots, Tassin/Chardin rides his little pony from village to mission to village, seeking out those who can tell him anything of Morel. When he locates them, he is a keenly attentive listener, for the first time in his life taking "an interest in anything under a hundred thousand years old." But why?

The answer, I believe, is simple, and yet gives to the novel its deepest layer of meaning. As a paleontologist Chardin studied past human evolution, as a philosopher he wrote of a future evolution which would bring humankind not only closer to God but to a state of oneness with the earth, possessed of intellectual and ethical resources equal to the task of being the planet's dominant animal. I believe that Tassin/Chardin, lifelong seeker of missing links to our past, sensed that in Morel he had found a missing link to our future. Indeed, Morel himself provides a clue to this evolutionary interpretation when he says, "The mud doesn't last forever. We'll crawl out of it like other prehistoric beasts. In the end we'll have lungs to breathe with and we'll become men; we'll become a human species at last."

Conclusion

In the final few words of each book, the author reiterates by implication the theme of future human evolution. Leopold writes of "building receptivity into the still unlovely human mind" (emphasis added). Gary has Tassin riding his pony off into the bush, contemplating a future about which "He was smiling."

This dream of ethical evolution seems to have achieved partial fruition. Gary's little band of warriors have been succeeded by Greenpeace, Sea Shepherd, Earth First!, anonymous monkeywrenchers, and others willing to place their bodies before the bulldozers. Leopold's hope for the progress of law attained reality in such legislation as NEPA, the Endangered Species Act, the Wilderness Preservation Act, and the Alaska Lands Act, however poorly such laws have been enforced during the Reagan years.

But recent decades have a flip side. With the world's population five times greater than it was only 190 years ago, we are engaged in a vast planetary experiment holding no persuasive problem of success. Species are being extirpated at alarming rates. Ecologically gentle, sustainable cultures and their accrued wisdom have been eradicated by arrogant and predictably self-destructive ones. And, of recent concern to me, there is the tendency for aggressive, self-seeking persons to attain power in the major institutions of the latter cultures. Thus do institutions and their upper echelons mutually reinforce their dedication to acquisitiveness and growth, with environmental degradation the consistent result.

One wonders what prognoses Leopold, Chardin, and Gary would make today could they view the race between ethical evolution and ecological armageddon.

SCIENCE AND ENVIRONMENTAL ALTERNATIVE EDUCATION (SEA) EDUCATION)

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Current evidence indicates that there is not only a chronological decline in interest toward science, but a trend toward increasingly negative attitudes toward science. Elementary students up to the age of nine indicate enthusiasm and desire to participate in science activities, including the pursuit of science careers. However, students become less enthusiastic with further schooling. This may be attributable to 60-63% of the students at ages 13 and 17 respectively, finding science seldom or never too easy. The 1983 Science Assessment Research Project, conducted by the University of Minnesota, continues to indicate a decline in general achievement and attitudes toward science. Concurrently, the methodology of the teaching of science may be a poignant factor.

Through direct studies of attitude changes toward science, the amount of time spent on field trips was related to attitudes about science and environmental concepts. The current trend in innovative curriculum is toward field studies. An example would be an interdisciplinary approach in which math, English and the physical and biological sciences may be integrated by field work and in-classroom laboratory experiences to demonstrate ecological concepts.

Recently, a spate of governmental reports and studies have recommended the upgrading of graduation requirements in math and science from one to three years. The instructional consequences of this legislation, State Statute 232.246, General Requirements for High School Graduation, has led to the following projected instructional consequences: 1) an increase in the number of dropouts for general students who are below average academically, 2) existing science courses are too difficult for the bottom 50% of the student body, and 3) new courses need to be developed to meet the needs and capabilities of non-college bound students.

During the past five years, the number of dropouts, sixteen and over, has increased 50% in Dade County schools. Approximately 30% of Dade County's students drop out annually. State Statute 230.2315 describes educational alternative programs as those that meet the needs of students who are disruptive or unsuccessful in a normal school environment. These programs may be in one or more of the following forms: any alternative to suspension or expulsion approved by the Dade County School Board. In policy 60-X-13-5P1.032, Educational Alternative Programs, a program is provided for students who: 1) demonstrate lack of sufficient involvement in a traditional school program to achieve success because their interests, needs, or talents are not being addressed; and 2) show unsatisfactory academic progress and the effort to provide assistance is either rejected or ineffective.

Trends in the dropout rate of major U.S. cities and states depict alarming increases averaging 40-50% in student attrition. The vast majority of students representing minority populations enrolled in large, urban centers compose almost one-half of the at-risk student population.

Although both the District and State provide for an intermediate program as shown above, specific provision has not been allocated regarding a subject area approach as an alternative educational program for potential dropouts.

South Florida offers a unique ecological environment unparalleled in the continental United States. The use of field studies as the focus for a holistic, interdisciplinary approach to learning has never been fully explored or implemented in Dade County; combining the applications of mathematics and English, facilitation of computers, and the integration of the biological with the physical sciences toward addressing the impact of ecological issues of technology upon society.

A spate of research promulgates the premise that this methodology has positive effects on student attitudes toward science and may be equally correlative to schooling in general. As a motivational factor, the complementarity of field studies with laboratory experiences will generate curriculum development and instructional strategies linking all the academic disciplines toward the goals of understanding and affecting environmental issues in South Florida.

This setting will encourage a personal approach by instructors who embody the expertise to relate school to society, academics to the outside world, and environmental concepts to societal survival. This relevancy bridge could foster positive changes in students' attitudes toward science and the environment; school and community through improved self-concepts in a climate of active learning and community service.

The proposed alternative environmental education program will utilize both traditional and nontraditional educational approaches to stimulate motivation among targeted students which will produce positive behavior while increasing students' achievement in basic skills attainment as well as overall academic proficiency. Four periods of academic coursework, one period of electives, one period of environmental education (Marine Biology-Ecology), along with one period of tutorial or counseling will constitute the course of study. This interdisciplinary approach is a holistic focus toward making a significant impact on student success.

MOTIVATION: The core curriculum and focus of this program is field studies with reinforcement in the laboratory setting. Therefore, field work in various areas throughout Dade County will serve as the vehicle of motivation for studying the regular academic disciplines as they must be implemented into the core program.

LOW STUDENT/TEACHER RATIO: A 15.1 student/teacher ratio will maximize opportunities for individualized instruction incorporating teaching style with learning style, and mentoring in regard to specific problems. Reduced enrollment and limited class size would also encourage improved peer and teacher interrelationships. Small group instruction, as a standard for field work, will also enhance these relationships.

SCHOOL-BASED SETTING: This in-house agenda will augment motivation without disturbing the ethnic stability and demography of the neighborhood school climate accompanied by opportunity for extracurricular activities.

PARENT INVOLVEMENT: An integral factor of the program will be direct communication with parents and their participation in field activities.

GUIDANCE PERSONNEL: The core teacher will serve as a teacher/advisor along with individual and group consultations with counselors on a regular basis.

PROFESSIONAL/CAREER ORIENTATION: Career infusion will be developed as the linking agent for the various disciplines incorporated into the course of study. Career education will be related by the resource agencies, guest speakers, and professional and collegiate field guides involved with the field studies, along with the aid of the school occupational specialist.

The primary strategy of this program is the identification of potential dropouts, the development of a student profile in relation to curricular needs and interests, assessment of behavior patterns, and the utilization of community resources in the form of professional, business, and environmental personnel.

South Florida encompasses a multivariate environment for ecological studies. It is within this framework of integrated field work and laboratory activities that science can offer a meaningful foundation for academic success and personal enrichment whereby a holistic view of school subjects can interrelate to maximize learning.

The teacher/coordinator will be one of the existing personnel of the science department staff. Certification in secondary level education with a Master's Degree in areas of environmental education (marine biology, ecology, wildlife management) and completion of doctoral coursework in Curriculum and Instruction, Instructional Leadership will comprise base credentials. Other credentials should include: record of excellent teacher performance evaluations, firm classroom management skills, exceptional skill and rapport in maintaining humanistic relationships, ability to relate a holistic view to subject matter in a nonauthoritarian manner, and resourcefulness and creativity.

The coordinator will be responsible for the overall management of the program. This responsibility will include: coordinating the various activities of the counselors associated with the program; arranging, planning, and developing the instructional materials to be implemented; maintaining a network of support agencies relative to environmental education on the local, state, and national level; organizing the laboratory and field study interaction that will form the basis for the core curriculum of the environmental studies block; and working cooperatively with the district office and the Inner City Marine Project in establishing objectives and policies for the environmental scope of the program.

Note: Additional information available from the author.

TEACHING ENVIRONMENTAL EDUCATION WITH A GLOBAL PERSPECTIVE

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What is global education? Global education may be defined as the lifelong growth in understanding, through study and participation of the world community and the interdependency of its people and systems - social, cultural, racial, economic, linguistic, technological and ecological. Global education requires an understanding of the values and priorities of the many cultures of the world as well as the acquisition of basic concepts and principles related to the world community. Global education leads to implementation and application of the global perspective in striving for just and peaceful solutions to world problems (Michigan Department of Education, 1978).

The world is faced with many complex environmental problems today that require international cooperation. Thus, it is important to introduce teachers to global environmental issues. This requires not only an understanding and knowledge of the issues, but an ability to implement environmental education with a global perspective in the teaching of science.

Thus, the objectives of this course are:

1. To understand the meaning of environmental education.
2. To acquire an awareness, understanding and concern for global environmental problems, especially in developing countries.
3. To identify world conservation strategies.
4. To acknowledge and understand the need for conservation, preservation and wise use of natural resources throughout the world.
5. To learn how environmental ethics can be incorporated in the teaching of science.
6. To promote critical and holistic thinking in environmental problem solving.
7. To acquire the ability to measure students' environmental attitudes.
8. To appreciate the importance of international cooperation and action toward the solving of environmental problems.
9. To implement environmental education with a holistic, multidisciplinary and global approach in the teaching of science.

The methodology for this program includes role playing; attending public hearings, debates, seminars; and, visiting technological and industrial institutions as well as government and environmental agencies. The model is a case-study approach and should be activity-oriented in nature, although lectures and discussions are also important.

The first part of the course is a discussion of "What is Environmental Education?" According to Jankovic (1977):

> "The aim of education is to make individuals aware of their own responsibility for protecting and improving the environment, so that they will make their own behavior and actions conform to the norms which ensure a healthy environment, so that they will initiate and participate in actions to protect the environment and will promote efforts by society to solve these problems at the local, national and international levels."

Likewise, the goal of environmental education as stated by the "Belgrade Charter: A Global Framework for Environmental Education" (1975) is:

> "To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones."

Both goals stress the importance of creating a world population not only aware and knowledgeable of environmental problems, but anxious to seek solutions at an international level. It is important for teachers to understand this so that they can in turn relate it to their students.

Part of understanding the nature of environmental education is to discuss the different components of environmental education which are as follows:

a) Perceptual awareness - knowledge and emotional responses about the environment resulting from experiences involving the senses.

b) Conceptual understanding of the natural environment - cognitive understanding of diversity, organization, interaction, continuity, change, limitation.

c) Conceptual understanding of the man-made environment - cognitive understanding of sociocultural systems, environmental issues, problems and the effects of man's activities.

d) Aesthetic discrimination -making aesthetic judgments related to order, harmony, fulfillment, beauty, concern for integrity of all aspects of the environment.

e) Values and values clarification - human actions are reflections of values held, and the understanding of one's own values includes the process of values clarification.

f) Fostering creative abilities and attitudes - responding to environmental issues and problems as an individual who is able to question, to be open-minded, and to resolve issues in a creative manner.

g) Humanism - valuing the dignity and integrity of humankind as a result of examining values, attitudes, and behavior.

h) Organizational skills and knowledge - ability to design and carry out the investigation of natural and anthropogenic environments.

i) Decision making - able to develop alternative solutions to environmental issues and problems, choosing a course of action to pursue, and implementing that course of action.

Section 2 of the syllabus deals with the history of environmental problems. It is my belief that in order to solve present environmental problems or to prevent future ones, one must try to understand environmental decay in its historical context.

In an article entitled "Is Survival Enough?" Dubos (1978) states that:

> "Adaptability is an asset for biological survival, but paradoxically the greatest threat to the quality of human life is that the human species is so immensely adaptable that it can survive under the most objectionable conditions... Admittedly, human beings are so adaptable that they can survive, function, and multiply despite malnutrition, environmental pollution, excessive sensory stimuli, ugliness, boredom, and high population density."

This has been apparent throughout history but is perhaps becoming more acute. Our current environmental problems have developed over the centuries and have deep cultural and technological roots. According to White (1967), the Judeo-Christian belief separates humans from and above nature and other living organisms. It stresses that humans should hold dominion over them. Although there is stewardship implied, the themes of hierarchy (man above the beasts, below the angels) and dominion (nature is the possession of man) have tended to be the dominant ones.

The Renaissance, the Reformation and the rise of rationalism and science all combined to weaken the authority of the Church. This new idea of progress was primarily material rather than spiritual. The exploitation, control and manipulation of nature became important. Scientists sought to understand the "secrets" of nature. Technologists sought to devise tools and machines to extract what humans needed from nature. Economists began to conceive of nature as an object to be exploited. They postulated that air and water were "free goods" which every person or corporation could use without any responsibility for purity or maintenance. The power of these intellectual and mechanical tools to exploit nature became clear in the Industrial Revolution.

But a number of subcultures and traditions that have expressed simplicity, harmony with nature, and conservation have persisted. In non-Western cultures human beings are viewed as an integral part of nature. Nature is seen in spiritual terms. It is not simply an object of human enterprise but is filled with good and evil spirits and tied directly to religious beliefs. Humans do not control nature, but try to work with it.

The non-Westerner sees and believes in change, but sees it more in terms of the natural cycles of life, death and rebirth.

Section 3 deals with ethics and values. Here, one must first define the terms. Ethics is the organization of our conduct by concepts which hold it together as a whole, concepts such as honesty and human dignity. It is the study of man in society and the science of duty. But we must stress that duty, in turn, is based on values of a given society. The values we have in North America for example, may not be the same as those of South American cultures. Philosophers studying ethics are especially interested in thinking about what is right or wrong, good or bad, duty and obligation. When this interest is primarily focused on environmental concerns, whether it be pesticide use in agriculture, dumping chemicals in water, protecting wetlands, the call to save endangered marine mammals, the questions being asked are questions of environmental ethics.

There are some who believe that you cannot teach the concepts of morality and ethics, and that is incorrect. We have functional models of how people develop their moral sense. We do know that if we want people to reason in an ethical way, they must have practice doing it, in a structured sense. There are curriculum materials for courses in science in which a significant portion of the material asks people to do that type of reasoning.

The kind of environmental values we should communicate and teach is the theme of section 4. According to Paehlke (1986), a set of possible environmental values could be:

a) an appreciation of all life forms and an understanding of the complexities of the ecological "web of life".

b) a need for evidence of the long-term sustainability of any human economic undertaking.

c) a revulsion with waste in the face of human need; in more extreme form an inclination to asceticism.

d) a love of simplicity and an aesthetic sensitivity to seasons, climate and nature.

e) an attraction to autonomy and self-management in human endeavors; some appreciation of the appeal of political and/or demographic decentralization.

f) an extended time horizon, meaning that environmentalists are future-oriented in terms of long-term futures and not short-term benefits and solutions.

g) an interest in non-material values; environmentalists believe that success would be better determined in terms of such things as skill, achievement, integrity, originality and creativity.

I strongly believe that simply teaching science is not enough. We must also communicate environmental ethics. Teachers need to learn this. In an educational system which serves democracy, people must be given the opportunity to discuss values and issues. Only when environmental values can be expressed and communicated will environmental improvement become possible. Global environmental problems of concern are the theme in section 5. The "World Conservation Strategy" was commissioned by the United Nations Environment Programme in cooperation with the World Wildlife Fund. The International Union for the Conservation of Nature (IUCN) was given the responsibility of conducting the research and drafting the final document. By 1980 the World Conservation Strategy was launched at centers in 34 countries throughout the world. The purpose of the strategy is to help the governments and the people of the world to place in motion a plan of action that will guarantee sustainable development through the conservation of living resources. The target groups have been identified as governments, industry and business, conservationists, environmentalists and educators of the world.

The main issues of concern are world food supplies, forest lands, marine resources, genetic diversity, overpopulation and nuclear disarmament.

a) Food supply - Throughout the world today, less than 10 percent of the land surface is suitable for agriculture and approximately 20 percent of the earth's land surface is available for the grazing of farm animals. All over the world, cropland is being lost at an alarming rate. Prime agricultural land is being lost to urbanization. The mismanagement of grazing lands has reduced the available meat supply throughout the world. Overstocking has had serious negative effects throughout Africa, the Mediterranean and the Near East. Such mismanagement has led to desertification.

b) Forest lands - The second problem area identified by the Strategy relates to the frightening loss of forest lands throughout the world. During the last 25 years, half of all forest lands on earth have been destroyed. Forests tend to influence local and regional climates, generally serving to moderate the filters and, in some cases, they increase the availability of water by intercepting moisture from the clouds. This is particularly important when considering the tropical cloud forests. Deforestation is going on in many parts of the world including South America, Central America, and the Caribbean Islands, to name a few. Forests of the world are part of a global commons which must be preserved at all costs.

c) Marine resources - The first problem identified is the destruction of wetlands throughout the world. Wetlands (sometimes described as bogs, marshes, mud flats, swamps and mangroves) are one of the most valuable links in the planet's chain of genetic diversity. Wetlands contain the greatest variety and diversity of plant and animal species. Two-thirds of the world's fisheries are dependent upon the fertility which is found in these environments.

The oceans, which cover seven-tenths of the earth's surface, present many examples of mismanagement. Overfishing has seriously diminished the annual world catch. At the present time, 25 of the world's most valuable fisheries are seriously depleted.

Coral reefs cover 0.1 percent of the earth. Besides intrinsic beauty, there are also important economic and ecological values attributed to coral reefs. Reef fish are important sources of protein and food for many people living in the Tropics. They are also an aesthetic resource important to the tourist industry, especially SCUBA-diving and snorkeling. Certain antibiotics are derived from corals, sponges, and sea anenomes. They are known for their tremendous diversity and complexity of living organisms. They provide feeding grounds for reef organisms as well as shelter, habitat and nurseries. Yet in some areas of the world such as the Philippines, Japan, several of the Caribbean Islands, Costa Rica, there is much concern over the deterioration or destruction of reefs, particularly that attributed to human beings.

The oceans of the world are a tremendous source of food, energy, medicine, and minerals. Yet, are we doing enough to protect our marine environment? It seems that economic and political considerations far outweigh the ethical and aesthetic ones.

d) Preservation of genetic diversity - Two of the most serious threats to genetic diversity are overexploitation and the introduction of exotic species. The introduction of exotic species places a tremendous burden on native species because they compete for space, food, predation, habitat and the transmission of diseases and parasites. We must try to formulate in the minds of individuals a reverence for life and a land ethic.

e) Overpopulation - The present population of the world is estimated to be 5 billion people. If the world's population continues at its current rate of growth, it will take approximately 40 years for it to double. Also, 90 percent of this population increase will take place in Third World countries where hunger, poverty, and disease are already ravaging the people. This is not to say of course that overpopulation in developed nations is not a problem. Overcrowding in cities has devastating effects on both people and the environment.

f) Nuclear disarmament - Finally, the threat of a nuclear holocaust. This fear has hung heavily over all of us in the world for nearly two generations. All of us who call ourselves educators must try to develop in our students and in our government leaders the understanding and the realization that nuclear weapons must never be permitted in warfare. We must not only have a freeze, but a total nuclear disarmament.

Section 6 deals specifically with issues in Third World countries. Although there are several different topics one can discuss here, this paper will only focus on a few.

Despite potential limits of food production, there is ample evidence that current world hunger problems are basically problems of economics and politics. Grains, particularly wheat and corn, and soybeans are excellent foods for direct human consumption. Yet developed nations regularly feed these crops to animals to produce meat products. It is estimated that if people in developed countries reduced the amount of meat from their diet and ate more grains directly, as do most of the people in developing countries, there would be enough grain to feed another 3 to 5 billion people. However, because the poor cannot afford to pay $.30 a pound for grain, it goes toward producing $3.00 a pound meat for the affluent.

We see tropical rainforests in developing countries being converted to raise cattle for beef export to developed countries. Untapped marine resources such as krill, which could alleviate world hunger, are being exploited instead for cattle and pet food.

A major goal for colonialism was to exploit the agricultural base of the colony to produce luxury food and/or cash crops for the mother country. Thus, a large portion of the best agricultural land was put into the production of crops such as coffee, tea, citrus, bananas, cacao, cotton, tobacco, and sugarcane. While these territories have become independent countries, the legacy remains; a large portion of the agriculture in Africa, South America, Central America, and Asia remains devoted to cash crops for export that benefit a relatively few affluent individuals while production of food crops is inadequate or barely adequate to feed the population at large.

Routinely supplying food aid in an attempt to alleviate chronic hunger in developing countries can also be self-defeating. The poor cannot afford to pay high prices for food. Therefore, provision of foreign food for free undercuts the local market. Local markets must compete economically with free or low-cost imported food. When they cannot earn a profit, they stop producing and eventually enter the ranks of the poor. Hence, the availability of free food, while well-intended, often aggravates the very conditions of poverty and hunger that it is meant to alleviate.

Population is also a problem. China, the largest developing county, with over a billion people currently has the most stringent and comprehensive birth control policies of any nation. It can be considered a case study. Under their plan a one-child program has been instituted with an array of incentives and deterrents. The prime ones are as follows: paid leave to women who want abortions, a monthly subsidy to one-child families, job priority for single children, additional food rations, and housing preferences. Penalties for an excessive number of children in China include: repayment of bonuses for the first child if a second is born, payment for a "tax" for a second child, payment for higher prices for food for a second child, and denial of maternity leave and paid medical expenses after the first child. The fertility rate went down from 4.5 in the mid-1970's to about 2.6 in 1982. Because of this unique achievement, China is sometimes excluded from the demographic categories of developing countries.

Finally, as far as science and technology is concerned in developing countries, it is important to promote appropriate technology. Appropriate technology is directly relevant to the economic and social needs of people. It should not require a high degree of training or skill. It should utilize local resources that are plentiful and inexpensive. It should not require expensive, centralized work places; existing homes, farms, and small shops should suffice. Most important, it should allow many individuals to use their own talents and minds, express their creativity, and develop self-reliance.

Evidence indicates that if intelligent policies are pursued and proper environmental management is employed, developing countries will have a better chance. Consequently, every effort must be made to achieve sound ecological management of resources and pollution control as well as population stabilization.

In section 7, it is necessary for teachers to employ some technique such as a survey to measure environmental attitudes of their students as a pre and post test. Studies indicate that it is possible to change attitudes. Since attitudes, values and beliefs are a very important component of environmental education, it is imperative to observe this (Bohl, 1976; Braught, 1975).

Lastly, one should conclude by re-emphasizing the importance of responsibilities and obligations to future generations and the urgency for international co-operation and action. Science educators can also play an important role in incorporating environmental education in the teaching of science. Only through a massive educational endeavor will the attitudes and values of the world's citizens be sufficiently altered so that they will become aware of the seriousness of the problems which threaten their very existence and of their responsibility and moral obligation to work cooperatively to solve these problems.

APPENDIX I

I propose the following syllabus for a teacher-training education program:

1. What is Environmental Education?

2. The History of Environmental Problems.

3. Environmentalism and Values
    a. What do we mean by environmentalism?
    b. What are environmental values and ethics?
    c. What kind of environmental attitudes do we need?
    d. How can we promote environmental awareness?
    e. What prompts environmental concern?

4. What Kind of Environmental Values Should We Communicate and Teach?
    a. The Ecological Perspective
    b. Long-Term Sustainability
    c. Concern for Wasteful Consumption
    d. Valuing Simplicity
    e. Decentralism
    f. Extended Time Horizon
    g. Interest in Non-Material Values

5. The World Conservation Strategy/United Nations Environmental Program
    a. Food Supply
    b. Forest Lands
    c. Marine Resources
    d. Genetic Diversity
    e. Overpopulation
    f. Nuclear Disarmament

6. Environmental Education for the Third World
    a. Development
    b. Food and Population Problems

    c. Social and Economic Problems
    d. Environmental Public Policy
    e. Environmental Resource Management in Developing Countries
    f. Science and Technology in Developing Countries

7. Measurement of Environmental Attitudes
    a. Types of Attitude Questions
    b. Problems Affecting the Validity of Attitude Scales
    c. Can We Change Attitudes?

8. Recent Trends in Environmental Education

9. Environmental Education: A Holistic and Global Approach
    a. Responsibilities and Obligations to Future Generations
    b. The Logic of International Cooperation and Interaction
    c. The Role of Science Education in Education for the Environment.

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EDUCATION IN ACTION:
A COMMUNITY PROBLEM SOLVING PROGRAM FOR SCHOOLS

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A few years ago the University of Michigan's Behavior and Environment Program developed, in conjunction with Deakin University (Australia), an approach to education that takes the world as perceived by the students as starting point of all learning. A key assumption underlying the Action Research: Community Problem Solving (AR:CPS) model, is that the school and its community contain an abundance of rich material for making education more meaningful. Furthermore, AR:CPS is geared towards substituting feelings of apathy and powerlessness with the feeling that one - be it as an individual or in a group - indeed can make a difference. The approach therefore emphasizes that students should be given more responsibility in the planning of educational activities and should be provided with the opportunity to take responsible action in improving the quality of their community environment.

In cooperation with Faculty and Graduate students of the University of Michigan, teachers and students from the Ann Arbor and Detroit Public School systems, developed the model in different settings at various grade levels. The model has been used on Elementary and High School level from within various disciplines. The foundations and guiding assumptions of AR:CPS as well as classroom experiences and ways to start a similar project in your own classroom, have recently been put together in the Handbook: "Education in Action: A Community Problem Solving Program for Schools" (1) (Bull, et al., 1988). This article describes the AR:CPS model and its two components; Action Research and Community Problem Solving, using our most recent experiences with the model in a Detroit Middle School.

Action Research

Action Research dates back to the work of Kurt Lewin (1946) who in the nineteen forties developed a methodology to assist workers in improving their work environment. Participants identified and defined social and health problems which were apparent in their daily lives. After selecting and investigating what was for them the most pressing problem, the group designed a plan of action in order to improve the problem situation. In Lewin's Action Research, much time was spent on defining the actual problem before taking action. Every step along the way was evaluated by the participants themselves, rather than be an outside observer. When the desired changes occurred, the group proceeded in working on a new issue. When this was not the case, the group redefined the problem and adjusted the plan of action. The participants became engaged in a spiral process of critical reflection and action (see Figure 1). Lewin highly emphasized democratic decision making, a more equitable distribution of power, and the practical utilization of knowledge.

Community Problem Solving

Community Problem Solving makes up the second component of the AR:CPS model. In this model, education centers around improving a local environmental problem in cooperation with members of the community itself. We have found that there frequently exists a gap between school and community. The problems students are confronted with daily,at home and on the street are often not addressed in the classroom. Many inner city students "...only have to look out the classroom window at the uncollected garbage, and the angry young men to realize that the shiny world the teacher talks about is as best fiction, and at worst a lie" (Schrag, 1971).

The AR:CPS approach tries to bridge this gap through using the students' own experiences and involving the local community. An important objective is to increase students' self confidence through enabling them to discover that they indeed can make a difference. Furthermore it is assumed that giving students a chance to investigate and act upon a problem that they experience in their every day life, will increase their motivation to learn and will develop skills they will be able to utilize later on in their life.

Important elements of community problem-solving are; identifying a problem; selecting a problem; collecting, organizing, and analyzing information; defining the problem from a variety of points of view; identifying, considering, and selecting alternatives; developing and carrying out a plan of action; and evaluating the outcome. In all steps the resources present in the community are utilized whenever possible.

Education in Action: AR:CPS

The AR:CPS approach to education starts out with a workshop in Action Research and Community Problem Solving followed by planning sessions between interested teachers and school administrators. The underlying principles of AR:CPS and its guiding assumptions are discussed among the involved teachers and administrators; students are asked whether they would be interested in participating in such a project; parents are informed about the project and asked for their input; and a tentative time line is established. Teachers will usually make a skill assessment of the class that wants to get involved. If certain skills are lacking, e.g. working in groups, he or she may choose to do some exercises that develop these skills before as well as during the project (2). In the classroom a project may being with brainstorming in small groups about problems students see in their school, neighborhood, and community. In one of our projects it was decided to take a tour through the neighborhood. The students discussed where they wanted to go using a map of the school area. During the walk the students pointed out and recorded some issues that concerned them.

The list of problems that appeared on the black board after three sessions in the Detroit projects consisted of close to eighty problems. Some problems that came up were: "what to do with the bodies of AIDS patients", "Crack", "Brown drinking water", "Homeless people", "the use of pesticides in the community", "dirty alleys", and "destruction of the ozone layer." Once critical problems had been identified, the groups started thinking of criteria that could help them narrow down this long list. The individual groups explained to each other why they selected a specific topic. The links between some of the problems were discussed and finally it was decided what problem would be researched. In one project six groups of five students worked on: "homeless people", "drug abuse", "toxic waste in the school", "traffic safety in the neighborhood", "vacant houses and lots", and "vandalism." In another project the class felt they would be more effective if the whole group would work on one topic. The group chose to work on litter.

Once the final topic has been selected the actual"research" starts. The direction and the nature of the "research" is determined by the students themselves with the guidance of the teacher. Research is put between quotations since in AR:CPS it is not necessarily scientific knowledge students are after but rather knowledge that can aid in understanding and improving a specific problem situation. In this phase, the class may choose to use newspaper articles; the school library (where they often will discover that there is little information about local issues); the yellow pages; local resources such as parents, administrators, other teachers, and local agencies; the school computer; and other sources they may come up with. The obtained information is documented in a log book and shared with all the group members. The teacher becomes a facilitator, source of information, coordinator of group activities and field trips, and provides in conjunction with administration and other teachers material the students want to use.

Once the students feel that they have collected enough information about the problem, a new phase is entered: finding ways to take action. It would be too pretentious to think that a group of students from inner city Detroit could solve the problem of drug abuse. An important element of the process therefore is defining what "success" is. What is reasonably possible in both the short and the long run? Obviously the point is not that the students actually "solve" the problem - although past projects have shown that for some problems this is indeed possible - but to get the problem moving. This can be achieved in many ways. The group on drug abuse, for instance, invited a speaker from a drug rehabilitation center to talk to close to a hundred students, and decided to "publish" a weekly newsletter for the whole class and the teachers in the school, in order to raise consciousness about drug related issues. The group on toxic waste in the school collected batteries and waste from chemistry classes, and brought under the admininistrator's attention that there was no school policy for these kinds of waste. In the past three years students have taken action in a variety of creative ways.

When the results of the action taken does not meet the students' criteria of success, they may redefine the problem using newly obtained perspectives, and subsequently modify their plan of action. In doing so the class goes through the spiral (Figure 1) as many times as required to reach a satisfactory solution. Eventually the results are reported out to all involved and interested parties, e.g.: parents, teachers, administrators, fellow students, local press, agencies.

A project like this involves an on-going evaluation by both students and teachers. Firstly through the use of the journals. Journals provide all participants with an opportunity to express their feelings about the project. Throughout the project students are given time to reflect on the project in their journal. Secondly, through the use of a log book. The students use a log book to record their achievements of the day and to write up an agenda for the next project period. Thirdly, through the use of "+.-, "sheets. Students can use these sheets to indicate what they like, don't like, and want to change about the project. Fourthly, through the Teacher's documented observations. He or she evaluates the skill level of the student's skills in e.g. problem solving and working in groups. He or she usually also discusses the strengths and shortcomings of the project with colleagues (3) which may result in more feedback.

Goals of the AR:CPS Model

The goals of the AR:CPS model are diverse and to an extent depend on the school's philosophy of education. Listed are goals that appear to be common throughout all the projects:

- involving students in the planning of their own education and, as a result, shifting more responsibility for education to the students themselves;
- placing education in a meaningful context for students;
- providing students with opportunities to apply acquired knowledge in improving a local problem that they themselves have identified and recognized to be important;
- developing skills needed in environmental problem solving including: working in groups; gathering, analyzing, synthesizing, and interpreting information; clarifying norms and values; designing, implementing, and evaluating a plan of action; and joint critical decision making;
- identifying and utilizing sources of information within the school's own surroundings for educational purposes;
- linking disciplines through focussing on a real world issue; giving teachers a chance to support each other in their teaching (and to actually get to know each other a little better...);
- substituting, whenever possible, feelings of apathy and powerlessness with the feeling that one, be it as an individual or in a group, indeed can make a difference.

The AR:CPS model clearly favors a "bottom up" approach in which teachers, students, administrators, and community have a major impact in the planning, executing and evaluating of educational activities. As of today, the curriculum and its instructional materials in American education are developed and tested outside the school. In this process the uniqueness of local circumstances and the experiences students bring to class are easily ignored. In the model described, emphasis is explicitly placed on the empowerment of the school community by allowing teachers and students' own ideas to be at the center of curriculum.

The above doesn't imply that interested teachers don't need support. On the contrary starting an AR:CPS project ia a lot easier when the administration is open to innovation; when there are some colleagues who show interest as well; and when there's room within the schedules for exploring the neighborhood and contacting resources. We also believe that teachers will be helped by the Handbook.

AR:CPS does not deny the current "back to the basics" movement. In a city such as Detroit, it is obvious that the "basics" are intrinsically linked to the context in which the students live. Next to reading, writing, and arithmetic; anticipating, and acting upon environmental problems can no longer be left out of the basics. Community problem solving is not only necessary from a basics point of view, it also provides an opportunity to make the other basics more meaningful to the students.

Footnotes

1) For more information about Action Research and Community Problem Solving and/or for ordering a copy of the 430 page handbook: "Education in Action: A Community Problem Solving Program for Schools" (cost $9.80 including postage), write to: Dr. Bill Stapp, University of Michigan, School of Natural Resources, Ann Arbor, MI 48109-1115 or Call: (313) 764-1410.

2) The "Education in Action: a Community Problem Solving Program for Schools" handbook contains a comprehensive section with activities teachers can do with their students in order to build these skills.

3) We recommend that schools set up an AR:CPS committee consisting of interested teachers and administrators for planning, coordinating, and evaluating a project. Such a committee can provide tremendous support for teachers who actually start a project in the class room.

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NEPA AND OFFSHORE OIL IN NORTHERN CALIFORNIA:
A CASE STUDY...OR WHAT DOES ALL THIS PAPER GET US

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Environmental impact statements are a means to let the public and decision-makers know about the potential effects of a project before it is approved. With that knowledge, the public and decision-makers are able to incorporate environmental considerations into the decision-making process. Unfortunately, environmental impact statements often fail to be of much help to either decision-makers or the public. This paper reviews the environmental impact statement process for a particular federal action, the leasing of exploration and development rights for oil and gas off the Northern California Coast (Lease Sale 91).

Problems with the EIS Process

The environmental impact statement review process is a poor vehicle for people to express their attitudes towards a project.

The EIS process was developed to facilitate public participation and to add information about environmental impacts to the decision-making process. The NEPA regulations call for an EIS to be "concise, clear, and to the point, and that federal agencies shall...encourage and facilitate public involvement in decisions which affect the quality of the human environment" (CEQ, 1986). Unfortunately, EIS's often do not meet these standards.

Ideally, the EIS would take a complex project and explain the likely effects of that project in a brief and clear fashion. Members of the public could read this statement and develop an understanding of what the consequences of the project would likely be. In contrast, the Draft EIS for Lease Sale 91 was lengthy (over 1200 pages) and complex. While offshore oil development, especially on the west coast, is admittedly a controversial and complicated issue, only the very dedicated could be expected to read the EIS for Lease Sale 91.

Interest at the several days of public hearings held to solicit comments on the Draft EIS was high. However, there was little evidence from the testimony given by members of the public that the DEIS had been read. The public hearing did provide people with the opportunity to voice their opposition to or support of the proposal. Unfortunately, other than the political value of their statements, they did little to contribute to the purpose of the hearing -- to get comments on the content of the Draft EIS.

The primary consumers of the DEIS were not the public, but rather individuals and organizations with specialized knowledge regarding technical areas discussed in the DEIS. At this level, the DEIS appeared to work well in that the reviewers of the document had the expertise to comment on specific aspects of the DEIS.

As a technical document, the DEIS did not seek to minimize adverse impacts or enhance the quality of the human environment, but rather was developed in a way that ignores concerns and forces poor choices.

While many criticisms have been made regarding the content of the DEIS, one of the most telling deficiencies involved the consideration of project development alternatives. The development of "reasonable alternatives" which "sharply define the issues and provide a clear basis for choice" is the heart of the environmental impact statement: "...it should present the environmental impacts of the proposed action and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis of choice among options by the decision-maker and the public" (CEQ, 1986).

Instead, the DEIS presented alternatives that avoided mitigation suggestions offered in previously held local scoping sessions, and specified alternatives in a way that ignored the character of the natural and human environment. The alternatives presented reflected a rather arbitrary approach that offered the choice of developing both, one, or neither of the two geologic basins in the lease sale area. The two basins lie off of two adjacent Northern California counties. This "all or nothing" approach, that had overtones of playing one county off against another, gave readers a choice of either not leasing an area at all or accepting the full impacts of the project.

In fact, there is a substantial middle ground where mitigation measures may be effective. For example, impacts to fisheries might be reduced through a combination of avoiding sensitive areas, and specific development requirements to mitigate other conflicts.

Review time and local expertise is limited. A complex and adversarial EIS often outstrips the ability of small organizations and individuals to respond.

The typical review period of 60 days for a Draft EIS is only adequate if the document is compact, concise, and clear. It is hardly adequate for reviewers who must digest the document, and also need to research information to include in their responses. To respond to the document on a comprehensive basis, it is necessary to spend months assembling information, much of which is difficult to obtain.

Review of the DEIS requires not only that errors in the text be identified, but often more importantly, that items left out of the document entirely be recognized. While review is difficult for those familiar with the issues, it is nearly impossible for the novice.

It is difficult to predict many of the impacts associated with the ultimate development of the project.

There are many impacts associated with this proposal that are very difficult to predict, yet a decision to proceed with the proposal will result in their occurrence. Incomplete knowledge makes it hard to project impacts. This range of uncertainty was not always communicated well in the DEIS, and without a sense of it, the reader may draw substantially incorrect conclusions.

Some Suggestions for Changing the EIS Process

The purposes stated in the NEPA regulations are valued goals which should produce a clear, concise statement of environmental information which the public and decision-makers can use to restore and enhance the quality of the human environment. Unfortunately, EIS's typically fall quite short of this goal.

Environmental impact statements should be prepared by independent bodies that do not have a direct interest in the advocacy of the project.

While the conflict of interest seems clear enough, EIS's (and their counterparts prepared under state law) are usually written by those who have an interest in the project being built with a minimum of interference. It is unrealistic to expect an organization to be uninfluenced by the internal desire to promote the proposal. Too often EIS's are an exercise in saying enough to pass the inevitable court challenge, without really doing anything to harm the project. Objectivity comes in many shades of gray. Ideally, an EIS should take a credible middle line.

Environmental impact statements should consist of a concise and clear primary document that the public could actually read and understand. The "technical" information should be presented in an appendix.

As it is now, the public and probably most decision-makers, do not read an EIS; certainly not from cover to cover. The body of the EIS should be useful to the general interest reader. This is what the NEPA regulations call for, but what is so rarely done.

The "technical" information upon which impact projections have been made, as well as the detail of those projections, is very important to technically oriented staff and individuals reviewing the DEIS. It is here that the integrity of the document is revealed.

Opportunities for public input should be available that are in addition to the opportunities to comment on the Draft EIS itself.

The focus of the Draft EIS hearing is officially on soliciting comments on the DEIS itself. Many of the comments are directed at the project, but not specifically at the DEIS. This tends to obscure the discussion of the adequacy of the DEIS.

The EIS process should permit iterative review, with an additional draft being required when there are a significant number of content-related comments.

This is already provided for in NEPA, but is not often used. The preparing agency is required to respond to comments made on the Draft EIS as part of the Final EIS. Unfortunately, if the Draft is extensively revised, the opportunity of commenters to review the changes is lost. An additional round of comments would reduce the incentive to prepare poor Draft EIS's, that are replaced with much improved, but only barely adequate Final versions.

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NATIONAL GEOGRAPHIC SOCIETY'S KIDS NETWORK

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The Kids Network was a pilot program which used an interactive computer network for children in grades 4 to 6. Students learn the basics of telecommunication, develop understandings of environmental issues, and gain skills in scientific data collection. It is currently under development by the Technical Education Research Center in partnership with the National Geographic Society with funding from the National Science Foundation.

Kids Network consisted of 160 classrooms nationwide. The classes were primarily concentrated in the eastern and northern part of the United States. However, some sites existed in nearly all the contiguous states. The network was then subdivided into working clusters of approximately ten schools, The divisions were necessary to allow intellectually manageable groups for the exchange of detailed data and ideas. Schools were placed within a cluster to allow for the widest possible distribution.

Using this national telecommunications approach, it was hoped that students would develop a better working knowledge of their environment. Through hands-on scientific investigation of today's real problems, i.e., acid rain, the magnitude of the problems could be seen. The sense of scope gained goes beyond an individual child or class. It included the ideas, concerns, and solutions as seen through the eyes of their peers within the network.

All sites were linked by a computer networking system to a central computer located in Washington, D.C. Individual schools were able to communicate with each other via computers and software provided as part of Kids Network. Information and ideas could be shared throughout the entire network or within your cluster. Data collected by individual schools within the network were sent to the central system and tallied. The results were graphically displayed and placed back into the system. Once these results were available, individual schools could analyze and discuss these results. In addition, detailed information gathered in their own experiments could be transmitted to all schools in their cluster for comparison. This was accomplished using electronic mail boxes. The mailing system also allowed each individual school to send messages to any school in the network.

To accomplish this project, the pilot was constructed to be implemented in two phases. The first, titled "Hello!," provided basic computer instruction, data collection, and transmission via the telecommunication network. Students collected demographic data on themselves and the places they live. Through comparisons, students gained a sense of the scope of the network and were able to see how human activity is related to a geographic area. Hands-on activities were used to not only develop concepts but also skills and attitudes of a scientist.

Phase two deals with "Acid Rain." The unit begins with instruction in the environmental problems associated with acid rain. Students learn to construct their own equipment and techniques for sampling and analysis of acid rain. Data collected on the effects of acid rain in their locale were entered into the network. As the data were compiled, each site began to analyze the data. Students interactively communicated with each other during this time using the electronic mail boxes. Problems they have encountered, analysis of data, and potential solutions are discussed by the students.

Formal evaluation of the pilot is currently underway by the Technical Education Research Center. The center is evaluating the program's structure, knowledge base and participants' attitudes. After revisions, plans have been proposed to construct and implement eight more units over the next four years.

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MULTICULTURAL NETWORKING - ONE YEAR LATER

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The problems of networking are paramount for a non-formal non-profit environmental organization as resource sharing is a necessity. When the maintenance of a data base is also involved, the problems become more difficult. What kind of data is to be generated, organized and made accessible to what level of society for what returns are problems that begin with the inception of the environmental group itself and its, as yet unknown, users. These users may be formal, non-formal, industrial or institutional.

It was with this agenda in mind that workshops were selected for attendance during the 1987 NAEE Conference in Quebec. One year later the techniques selected from six presentations have borne, in some cases unexpected, fruit. The problems encountered and identified during our following year of experimentation may aid in the generation of more efficient techniques of resource transfer basic to active networking. Selected programs were the New York Botanical Garden's Institute of Ecosystem Studies Pollution Garden (1), Tennessee Water Quality Monitoring (2), Jacques-Cartier Park's Alcide (3), the Curriculum Data Base program (4), Art at the Service of Environmental Education (5) and the Grant workshop.

The first factor, unrecognized, was that of resource identification and evaluation. The fact that all of the techniques selected as resources did not answer to the same selection criteria went unrecognized. The importance of this oversight was demonstrated by later results. The second factor was the mechanical form in which the resource was transferred. Those carrying agenda, assumptions, or coding did not integrate into our site as expected. ?The third factor, and the crux of all environmental data, was context. Context, when measured by time and transient relationships, changed all potentials.

As a watershed, a geographic term, a cartographic framework seemed the most appropriate as a limiting and organizing form for our programmatic data base. If program efforts are to be interpretive of factors indigenous to a specific site, as ours are, the program and site inventory data base is one and the same. Museum, library and collection listings must find referral points in an otherwise graphic mode.

A computer type matrix was developed using U.S. geodetic quadrangle coordinates as map referents while significant symbols embedded within the several data lists were used to organize the non-graphic data with the graphic. Transparent overlays of different subject areas were used to identify contexts, relationships and sequences visually. Comparison time lines take very well to graphic representation as do genealogies, tax records and inventory maps.

It was against this graphic background that the"Art at the Service of Environmental Education" program caught our conference interest. Although the beautiful colored posters were far beyond our physical or financial resources, the idea did develop into a black and white pictorial trail map and guide that was privately printed to sustain a large historic program, Walton's Way, on our site. A mini-network developed from this project as diverse participants realized that further cooperation could advance their own historical projects as well as our data base.

The New York Botanical Garden's Pollution Garden drew our attention as it demonstrated a site specific environmental impact with appropriate measurement techniques botanically to the public. Its similarity to our Langstroth Bee Garden, site specific program rationale and its heavy use of graphics struck responsive notes. Had we a clearer idea of the melody, it would not have taken us so long to develop the Butterfly Garden (less demanding than fish) demonstrating environmental impact as measured by plant diversity and adaptation. We also found that our public was more interested in warm beer butterfly mash than ozone depletion. Even so, had it not been for the program infrastructure already supporting the Langstroth Bee garden, it is doubted that the Butterfly Garden would have taken form. However, the research aspect, as represented by a science fair recruited student, gives a new dimension to the Langstroth complex. The butterfly research and garden will become the curriculum for next summers children's programs and the following fall's Pennsylvania Flower Show education entry....again, a mini-network.

The results of our Tennessee Stream Watch program experiment were completely unexpected. Fortunately for us the value of the project was more as a study in networking than in water quality monitoring. Personal working communication among key individuals proved essential in networking with groups enfranchised and not enfranchised within a single system. The burden of administrative responsibility for "successful" results appeared to be a salient factor in official resource exchange. Only personal communication bridged the gap. The project did produce an active alliance between Philadelphia County residents, through "Friends of the Pennypack", and our professional, Montgomery County based watershed association. Since Philadelphia school teachers are not permitted to transport classes outside the county, it is appropriate that members of Friends will man our watershed presentation at the upcoming "Beyond The Blackboard" conference in the Philadelphia Civic Center. The conference is organized by the Museum Consortium, which in itself is made up of several historic site consortiums. Our Interpretive techniques supply an interface between formal curriculum and site resources. The focus of the conference is networking. The contacts within the consortiums are personal, environmental educator to educator.

Misplaced resource value demonstrated itself in the assumption of our interpretive curricula without transfer of the technique itself by a local school district. Classroom teachers of the district recognized our materials as answering their new guidelines for classroom presentations. However the only time they would consider spending in familiarization with the technique had to be through paid in-service workshops arranged by us through the Intermediate Unit. Since, as a non-profit environmental group, we had neither the resources nor needs to become involved in such an effort, the unused curricula lies in many classroom bottom drawers...a networking failure. The same fate befell all the professionally produced process-based curricula such as Project Learning Tree, Project Wild, Obis (all acquired through workshop attendance) which grace our teacher resource center. The Curriculum Data Base project picked up in Quebec was abandoned by us because, except for our own professional inventory needs, there was no one who understood the Dewey decimal system to use it. Our resource library is well used but organized as a vertical file into three libraries: natural history, social history and arts and crafts as more appropriate to our users needs.

Also abandoned was the Grant writing project begun in the Quebec workshop. Perhaps lost is a better word. The grant writing project became so important a priority that all the research, goal statement work, etc. was transferred to a special group organized for that purpose. That was the end of it. The result worked out just as well as we were then free to follow the adaptive processes that led to the creation of the Butterfly Garden. ?The perception of value and priority has to be recognized as a shifting factor and as such will affect the effectiveness of networking.

The Jacques-Cartier Park program "Alcide" (the moose) found translation in our "Hosimer" a white tail deer. Alcide's booklet was replaced by a summer curriculum of ten lesson plans which led children and families into "deer country". This material formed the theme for the fall flower show education entry "Deer ecology of the Pennypack Valley". Hosimer is a wooden deer that acts as a traveling display case for the center's museum and off-site displays. He will be traveling to a Girl Scout environmental impact weekend workshop and the museum consortium conference. Since all our programs must be financially self supporting, the deer patches, similar in function to the Alcide buttons, just managed to pay for themselves. Therefore the program patch experiment will not be repeated.

The experiments demonstrated that productive networking cannot be an assumed "given" just because resources appear available. A network must have a two-way flow of value appropriate to the contexts of the participants. Assigned values or codes inhibit free flow of common data unless a universal entry point to the framework is provided. Even through our data base is set up on a computer model, all entries are still being done by hand on paper as we have no computer hardware. The logic of the computer organization was the important resource.

Footnotes

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E.E. DURING AN ENVIRONMENTAL CRISIS

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The Cause of the Water Crisis

On January 2, 1988, a large above-ground fuel storage tank in Floreffe, Allegheny County, Pennsylvania suddenly collapsed. The four million gallons of diesel fuel swept in a large wave toward the earthen dikes which surrounded the failed tank. Nearly 800,000 gallons of the wave sloshed over the dikes,broke a gas line from a neighboring tank, and the combined one million-plus gallons of fuel rushed down a nearby storm drain and into the Monongahela River just a few miles upstream from Pittsburgh.

Cleanup of the spill was hampered by cold weather, ice, and a swift-flowing river which carried the oil under the ice. In addition, the oil company owning the tank did not have a specific cleanup plan, the Coast Guard lacked the proper equipment needed, and water spilling over dams and locks mixed the oil throughout the river. As a result, only 176,000 gallons was recovered, leaving over 800,000 gallons of fuel to make its way down the Ohio River to the Mississippi, and eventually the Atlantic Ocean.

During its journey downriver, the fifty-mile long oil slick affected millions of people who were forced to ration water and over 100,000 people who lost their tap water altogether. Schools and businesses were closed, and commercial traffic on the river was halted. The spill killed an estimated 11,000 fish, 4,000 waterbirds, an unknown number of mammals, and contaminated dozens of miles of shoreline.

Environmental Education Problems Which Surfaced During the Crisis

As the communities of the Pittsburgh area rallied to respond to the water and wildlife crisis, a number of unforeseen problems appeared relating to environmental education. These problems can be grouped into three categories: Conservation, Wildlife and Technical.

Conservation. Following the spill, water companies who obtained their water from the river immediately closed their intakes. The supply remaining in the water systems could have been stretched to last several days or longer if conservation practices were enacted. Unfortunately, several problems prevented this plan from working properly:

1) There was a lack of understanding of what "conservation" actually meant. Members of the general public, media, local officials and legislators were frantically calling anyone they could think of to obtain answers to very basic questions (e.g. What can we do to conserve water? Should toilets be flushed every time? Are showers preferable to baths?). Many people took "conservation" to mean "stockpile" and promptly filled bathtubs, swimming pools, and buckets, which only drained the limited supply even faster.

2) There was a lack of knowledge about geography. People didn't know where they lived in relation to the spill. Were they upstream or downstream? Did they live within the service area of an affected water company?

3) There was a lack of public understanding of whether their water came from a river or from wells; and if their water was from a river, which one?

4) There were conflicting attitudes and messages about conservation from different sources (e.g. one county health department felt it was a health hazard not to flush every time, whereas the majority followed the saying: "If it's yellow let it mellow, if it's brown flush it down").

Wildlife. It quickly became apparent that wildlife were being affected and that something needed to be done to rescue and rehabilitate oiled animals. People were calling and bringing animals to the state Game Commission, the Pittsburgh Zoo, and Beechwood Farms Nature Center. The following problems quickly surfaced:

1) There was no predetermined lead group for dealing with a wildlife crisis of this type.

2) There was no one in the Pittsburgh area who knew how to properly clean and care for oil-covered waterbirds.

3) There was no volunteer crew which could be mobilized quickly to provide the thousands of person-hours needed to support an emergency wildlife rescue operation.

4) The location initially chosen as the field station for cleaning the birds turned out to be hooked up to river water, not to well water. As a result, the operation had to be moved to a new location.

5) As the operation began, it also became evident that the proper equipment was lacking to capture waterbirds.

Technical. Several technical problems which could have been avoided with better education and communication:

1) There was no central inventory of affected water systems readily available to the local and state officials, thus delaying the notification of affected communities. Each company had to be contacted for their individual lists and maps before it could be determined which areas were on downstream intake water lines; and the spill occurring on a Saturday made it all the more difficult to obtain the information.

2) There was no centralized information on region-wide resources available to contain the spill and to provide temporary drinking water (e.g. oil containment booms, water tanks, bottled water sources).

3) There were no linkages between water systems to share water (such as the grid system used by electric utilities).

4) There was no plan for fire suppression alternatives if water was not available.

Communication Which Worked Well

Despite the many communication and education problems during this event, there were a few activities which prevented the situation from getting any worse, and which served to solve some of the problems very quickly:

1. Pennsylvania had previously created the "Commonwealth Emergency News and Information Center" which could be mobilized for any situation to serve as a single, unified source of information for the media and public. This center was composed of a team of individuals who were previously appointed representing the Pennsylvania Emergency Management Agency, Department of Environmental Resources, Governor's Press Office, Lieutenant Governor's Office, the affected county, and the airport.

2. There was excellent county and state coordination and cooperation in finding solutions to the problems (e.g. finding alternate water supplies, and arranging for emergency linkages between water company lines).

3. The Pittsburgh media took it upon themselves to educate the public and provide information on conservation, water distribution points, and regular updates on the crisis. Once they knew what to tell the public, they did an outstanding job in helping to disseminate the information.

Preparing For A Future Crisis

A lot was learned as a result of this accident that can be used to better prepare state agencies, local governments, news media, environmental groups, and the general public for a water crisis. With so many communities depending on drinking water from river systems throughout Pennsylvania and North America, and with more fuels and chemicals being stored near and transported on the water courses of our continent, disasters of this nature will certainly continue to happen. We can, however, be better prepared for the needed communication and environmental education; and what follows is a list of some of the activities and planning which can be undertaken in advance.

- Conservation Education --State agencies and local groups can work cooperatively to ensure that educational materials are collected and/or developed for the many affected groups in the community. Water conservation information needs to be a part of an ongoing community education program, and also needs to be accessible for emergency distribution. The various target groups must include: media, public officials, legislators, schools and the general public. These materials should cover such topics as: What is water conservation? Where do we get our water? What do we do in an emergency? Are there different things we should do depending on the season?

- Regional Information -- Counties and municipalities need to pool their information on: potentially affected communities, water company intake points and service areas, available cleanup equipment for a worst-case accident, emergency water supply sources, and available mobile water tanks. In addition to distributing this information to relevant parties, establish a central repository for this information which would be accessible on weekends and evenings.

o Central Information Crisis Center -- Identify a single or coordinated contact point for disseminating information during a crisis to prevent conflicting messages to the public.

o Role of Media -- Ensure that the news media understands its vital role for citizen education in this type of a crisis.

o Role of Key Players -- Clarify the roles of the EPA, Coast Guard, State Environmental Protection Agency, and county and local officials. These agencies and officials need to understand that the important task is to work together to get through the crisis, then later sort out the events and determine who is at fault.

o Fire Suppression -- Identify the alternate fire suppression system to be used.

o Aquatic Sampling -- Determine in advance who will be responsible for taking samples of: 1) water above and below the spill at the time of the accident, 2) the material which was spilled, and 3) regular samples of the river downstream from the spill for a week after the accident. This is to detect any illegal chemical dumping by companies or individuals who might use the spill as an opportunity to dump other materials. Also determine who will be responsible for monitoring and analyzing detrimental effects to aquatic life.

o Wildlife Rescue and Rehabilitation --Develop an emergency plan which identifies the following: the lead organization, the organization responsible for the actual animal rescue, the needed equipment and know-how for capturing affected wildlife, the source of local volunteers, the nearest wildlife rehabilitation expertise, locations for a field station with a good, safe water supply, veterinary assistance, medical equipment suppliers. If a wildlife crisis is likely or is recurring, some advance training by an expert is recommended.

NOTE: Additional information available from the author.

KEYNOTE ADDRESSES

AGRICULTURE, SPACE AND ENVIRONMENTAL EDUCATION

Susan Forte
Florida's Teacher in Space

I am very excited about having the opportunity to share with you at lunch today. As a Florida native I want to take the opportunity to welcome you to the sunshine state. One of our very highest priorities here and throughout the world should be maintaining our natural resources. As we move toward the 21st century all the culture of this world and all of us individually are going to feel the impact by technology on world environmental changes. Some, we are already experiencing. The global challenge that we are facing involves changes. Change is just that--maintaining our precious natural resources. The question that we have to ask ourselves and I'm sure you've been asking yourselves throughout this conference, is how do we face such an enormous challenge? The answer, I believe, lies in four things: 1) research and education, 2) technology development, 3) transfer and adaptation of technology, and 4) communication. That's where we come in as educators!

Through these four actions we can maintain or even reclaim our natural resources--even those we have already begun to lose. I come to you from the discipline of agriculture. I also come to you from the discipline of teaching because I am an agriculture teacher. I've been teaching for eleven years. I primarily teach juniors and seniors in high school. I'm also very much involved in working with young people in leadership development and community development and in agricultural and environmental awareness. Through our student leadership organization we face a challenge. This challenge is to not only maintain quality, but also sustain a viable agricultural industry that can successfully compete at home and abroad. The key to accomplishing this is to include two needs--the need to be competitive and the need to be compatible with environmental concerns. I would like to share with you that agricultural leaders are very aware, as you are, of the interlocking relationship between technology, agricultural profitability and environmental quality. I can use Florida as an example. Agriculture runs neck and neck with tourism as the biggest industry in Florida. One out of 5 people is employed in agriculture. Agriculture generates 40 billion dollars in the Florida economy.

A massive amount of agricultural research is two-thirds environmental. Today I want to share with you the future world of agriculture, the future world of agriscience and agribusiness, and to share some techniques that are allowing us to remain competitive at home and abroad and at the same time maintain our environment.

We are all involved in the technology of agriculture. One of the most pressing areas of concern is water quality. The U.S. Dept. of Agriculture has established water quality as the number one priority. We are finding in agricultural engineering that engineers are developing lasers, sensors and computers to assist in irrigation water conservation. They are working on developing wastewater recycling and fertilizer application, and all efforts tied in with computers to upgrade weather forecasting. Weather is one of the few things over which we have no control. Research also continues with septic tank placement, conversion of urban waste to compost and reclamation of lands, especially mined phosphate lands in Florida. One of the newer developments in the past few years is the laser-guided landscraper. These machines have the ability to sculpt the earth into very minute terraces of one-half inch or less for the sole purpose of conserving irrigation water.

Hallophytes are plants that have been developed through biotechnology. This is another area of agricultural development that is currently having a tremendous impact. A hallophyte has been genetically engineered so that it can grow in salty water or even in salty soil. The ability to use hallophytes can have a tremendous impact on so many areas of the world that are restricted to using salty, sandy coastlines to produce food. We are seeing many things in biotechnology that will help us environmentally. In fact a great deal of the biotechnical research around the globe is in agriculture. Scientists hope to be able to generate a whole new generation of plants that require less water and perhaps require less fertilizer. Research is also continuing in biological control where scientists use insects that control other insect pests. Small wasps, for example, are used to control citrus diseases in Florida. In Florida we are also researching the use of certain species of fish to control many water weed problems. There is also much work being done with fungi and bacteria and their capacity to be used as natural pesticides. There is a great deal of work currently with microorganisms--some which have the ability to degrade pesticides that are already residual in the soil.

Researchers have discovered a microorganism that degrades 2-4D six times faster than the parent organism can. Agriculture has also been involved in Integrated Pest Management (IPM). Those involved have learned that eradication of insect problems is not the answer. There is a level to which to reduce the impact. Beyond that level profitability doesn't change. Biotechnology is very exciting and I'm sure a buzz word you have all heard.

Video-guided machinery has been created in agriculture. It is now possible to program machinery to travel by itself. Development involved a lot of program computer work. Satellite imagery is also having a tremendous impact on agriculture as well as the rest of the world. Through satellite imagery we have been able to determine that we have a large hole in our atmosphere. Satellite imagery is allowing us to monitor large expanses of land. Through satellite imagery we are able to detect insect infestation, disease problems and drought problems. We've learned that all living things--plants and animals, even down to the species level--give off varying amounts of electromagnetic radiation. With satellite imagery we can detect this and can actually monitor this from outer space. This is a tremendously valuable management tool for natural resources, the environment and agriculture.

Robotics is a new emerging area that is very exciting. At the University of Florida they are developing a robotic citrus harvester. We've been talking this week about multicultural influences, the global aspects of the environment. This whole project in developing the robotic citrus harvester is funded by Italy even though the research and development was conducted in the U.S. The prototype was recently shipped to Italy.

Aquaculture is another new and emerging occupational area. Aquaculture is not agriculture spelled wrong. Aquaculture is a discipline within the umbrella of agriculture. Researchers developed the technology to the point where we can raise fish in closed systems. That may prove to be very important. Instead of having to grow and raise fish in ponds or having to sea ranch to raise and grow seafood products on the ocean floor, there are now other options. We now have sufficient technology to begin teaching agricultural producers how to diversity into the fields of aquaculture. The U.S. currently imports 75% of the seafood products that we use. Fishery products are the second largest contributor to our national debt behind oil. There is a tremendous amount of work that needs to be done in developing aquaculture as a viable industry for American agriculture. There is a whole new area of education that we are faced with in developing curriculums. We must be able to teach our young people who are interested in this area as well as retrain agriculture producers that need to diversity.

When you talk about aquaculture you are not restricted to producing food fish. Tropical fish are also a very big industry in aquaculture. It is indeed sad that in many cases the tropical fish industry actually goes into the environment and removes the fish and sells them. With the technologies that are developing in agriscience we are trying to teach producers and young people how to accomplish production in a closed system. Florida produces 95% of the tropical fish that are raised and sold in this country. Tropical fish are the second largest hobby in the U.S. (Photography ranks first). Tropical fish production is not that much different from livestock production, except that water quality is very important. In aquaculture you have your own veterinarians, your own physiologists; they implant hormones in tropical fish and they can artificially inseminate tropical fish. The techniques used are not that far removed from those of livestock production.

Food technology is another growing area of occupational development that is having a real impact on society. One of the areas that receives a great deal of attention is using agricultural products and converting them into products other than food. The U.S. currently has surplus corn and wheat. We need funding for the research to convert these crops to products other than food. Euphorbis lactea is a plant under serious research for possible sources of a very efficient fuel. We are using agricultural products to produce fuels, industrial oils, plastics, fast food containers and ink. In the last few years a soybean oil-based ink has been developed which they use in newspaper printing. It is estimated that the use of this new ink could result in the demand for 20 million tons of soybeans a year. Additionally, if we could print newspapers on rice paper, using the soybean oil-based ink, then in the morning you could read your newspaper and then eat it afterwards. Agriculture research is very involved in food technology. This is one of the fastest growing areas in agriculture.

Biospheres is another important new concept. Biosphere One in Arizona is a major project. It is a multi-acre enclosed complex in which eight people will take up living for the next two years. It has seven climates within and scientists have been working for a number of years to select plant and animal species to put in Biosphere. Part of Biosphere One is an intensive agricultural complex. Biosphereans will be growing and raising all of their food in this complex. We hope to learn a great deal from the Biosphere project about the kinds of things we should be doing in our lives on earth. There will surely be a lot of new technology coming out of this major project. We are very global in our technology development. Biosphere is a project for example that is attracting worldwide attention.

As we look at all these technological advancements, we have to look at what is going to happen beyond Spaceship Earth. As we think about people living and working in space, we have to think about what people will eat in space. We have to think about the reality of zero gravity and we must ask how can we grow and raise food in space. Space agriculture is a very major project at this time at NASA. Controlled Ecological Life-Support System (CELS) gives ideas about how to grow and raise food in space. Ideas vary from rotating drums with a light source in the middle to other research that is being done at the various land grant universities around the nation to monitor all aspects of plant growth. At Purdue they are monitoring the effects of space motion on the growth of plants. NASA is doing their own research in the areas of foliage plants and flowers. They are looking at foliage plants and their ability to recycle air and wastewater. You can take a foliage plant, seal it inside an acrylic tube, flood the tube with formaldehyde gas and within a 24-hour period certain foliage plants will absorb 98% of the formaldehyde gas out of the air. Many plants are being researched in this manner to determine the implication for space travel and for activities here on earth. This research will be important especially for closed environments such as office buildings.

There will be animals in space. NASA predicts chickens, rabbits, turkeys, cattle, sheep and fish will be common. Aquaculture will be a major source of food in space. Space agriculture is a reality. At the Land Exhibit at EPCOT you can see exhibits of plants growing in lunar soil, and part of the CELS project where they are experimenting with actual methods of agriculture production as they will be used in space. As we look to the future--beyond Spaceship Earth--we are looking at the possibilities of a moon base. We may find ourselves dining on moon salads as we look back to the earth. There are long range plans to go to Mars and develop a permanent outpost there. Everything will be controlled; temperature, light, humidity. There may be agrobots who measure fertilizer, shear sheep, and pick fruit. Space agriculture is a reality. Through the research that goes on here, we will develop technology that will result in a lot of space spinoffs that will help improve agriculture on earth and make it more productive and efficient and more environmentally compatible with our natural resources.

Education and communication are the key. We are in a unique place in agriculture to impact that education and communication. We are in a key position to conduct research and to transfer results to the benefit of the public. This is made possible through the partnerships developed with the land grant institutions around the country. In Florida, there are 23 research stations which help foster this partnership. Additionally, there are 67 extension offices which provide that vital link for transferring the information to the public. Since 2/3 of the research is in or related to the environment, there is a major role for environmental education. We are also in a unique position to teach young people about agriculture and the environment through 4-H and through FFA. There is a 4-H program in Michigan called SPACES--which teaches youth about inner, outer and shared spaces. It is very global in perspective and it is designed to help youngsters learn about and how to adapt to changing technology.

We need a lot of teachers and educators to help communicate what is so important about conserving and preserving our environment. Sometimes we become discouraged by all the things we have to do. But I think that we have to continue to dream, continue to be bold in our efforts to communicate about environmental awareness, continue to take risks and challenges, continue to accept the new and believe in dreams. Hold fast your dreams, for if dreams die, life is a broken-winged bird that cannot fly.

When I think in terms of our progress in agricultural research, in terms of organizations such as NAEE in terms of our efforts to maintain or reclaim many of our resources, I can say the dream is alive. I encourage you to continue to promote environmental education and environmental awareness.

Thank you.

KEYNOTE ADDRESS

Nancy H. Roen
General Development Corporation
Miami, FL

I'm here today pinch-hitting for one of my fellow board members, Nat Reed. For those of you who know Nat, you know that it's a tall order! I share your disappointment that Nat could not be here today, and he does send his regrets, but I am also pleased to have the opportunity to meet you and to spend a few moments sharing thoughts on our mutual roles in crafting effective solutions to the increasingly complex environmental-social problems that we face in South Florida.

I believe there is a vital role for you, as environmental educators, not only to nurture an appreciation for and an understanding of our natural resources, but also to foster an awareness of the current institutional and legislative framework which you and your students can use to translate environmental values and expertise into effective and implementable water resource policy--to know how to work within and with the system is especially critical in these troubled times.

We seem to be barraged daily by facts which make it seem like everything is going to hell in a handbasket. Florida is on the verge of a crisis, with unprecedented, explosive growth assaulting our natural systems. A potential calamity is in the air! But crises are not new to Florida and all is not always doom and gloom.

It was a series of crises that gave rise to the evolution of water management in Florida. Devastating hurricanes ripping through South Florida in the 1940s generated the desperate need for a public works system that could adequately protect growing agricultural and urban communities from the ravages of flood waters. In response to this need, the federal government in 1947 authorized the Army Corps of Engineers to construct a massive flood control project--a system of canals, levees, pump stations and water control structures which today spans a 16-county region twice the size of the state of New Jersey. The project was designed to smooth out Mother Nature's rough edges--balancing water levels in order to protect against too much or too little water.

But, despite the effectiveness of this giant plumbing system, South Florida didn't have a guaranteed safeguard. In 1970/71, instead of the hurricanes of the 40s: drought! A drought which caused the Everglades to burn, enshrouding Miami for days, if not weeks, in heavy smoke. A drought that dried up wetlands and waterways. A drought that coaxed the ocean inland to poison public water supplies.

In the aftermath of this drought, an enlightened Florida leadership in a little over a year passed four major pieces of legislation which became the foundation for our present comprehensive planning/growth management program--a program which is a model throughout the country. One of those legislative initiatives was Chapter 373, the Water Resources Act, which created Florida's innovative system of regional Water Management Districts--a system unique in the world.

Water Management Districts are charged with both protecting and managing water resources. They have the muscle and the money to get the job done. As regulatory bodies, Districts permit water consumption and surface water management. As independent agencies of the state, Districts have authority to levy *ad valorem* taxes to fund their missions. At the South Florida Water Management District, juggling flood protection, water supply, environmental enhancement and water quality protection underscores the intricate interrelationships and balanced approach that is demanded for effective water management.

As water managers, we continue to face critical problems. Every month, our Board is confronted by both age-old and new controversies--the Everglades are in danger of being destroyed; Lake Okeechobee may be dying; explosive growth is leaving communities and even entire regions with imperiled water supplies; development is threatening agriculture and the precious few remaining wetlands; our flood control system is becoming antiquated and outgrown, outstripped by rampant growth; waterways are clogged by aquatic weeds exploding from excessive nutrient runoff, and water wars loom on the horizon. As we grapple with these seemingly unsurmountable odds, we realize both the need and urgency to find ways to improve the effectiveness of our problem solving.

What are the keys?

a) Effective institutional and legislative programs with which, I think, we are well served in Florida;
b) Excellence in science and technology;
c) Education, participation and consensus building.

The District is dedicated to excellence, demanding the best of our staff and the best science to accomplish complex and often conflicting goals.

We will look to you to develop our cadre for the future--to send us your best and brightest. You and your students must be out in the arena as vital and active players.

Some of you are already there:
Tom McVicar of our staff received national recognition and the Palladium Medal recognizing outstanding engineering achievements in environmental conservation for developing the rainfall model to restore more natural water flows to Everglades National Park.

Dr. George Marban has developed a computer model for a plan to counter the damaging effects of fresh water releases from Lake Okeechobee to the St. Lucie Estuary. "Pulse releases" simulating natural runoff now minimize upsetting the delicate salinity balances of the estuary.

To restore the environmental values of the Kissimmee River, we have enlisted the skills and know-how of the world's foremost expert on river hydrodynamics--Dr. H. W. Shen of the University of California at Berkeley--who will produce the physical and numerical modeling research which will guide our decision-making.

In addition to maintaining our own internal high standards, the District continues to recognize its responsibility to work with and educate government and diverse public and private interests in order to integrate land and water use decisions. A local government assistance program that was begun by the District three years ago has been successful in providing technical assistance and improving coordination and communication. This year, the District has organized a new division responsible for reviewing some 138 local government comprehensive plans between now and 1991. This review will give us an unparalleled opportunity to assure that the land use decisions of local governments will not jeopardize the integrity of their water resources.

Perhaps one of the most versatile and useful approaches has been dispute resolution and conflict management. The issues that confront us as water managers are rarely isolated or simple. They are complex, multi-dimensional dilemmas that involve not only resource decisions but social and political ramifications as well.

The Kissimmee River Symposium being held here over the next few days highlights successful mediation. The interactive planning process used on the Kissimmee, developed by former District consultant and executive program director, Dr. Patricia Bidol, recently received the 1988 planning award of the Florida Chapter of the American Planning Association.

How did the Kissimmee River Resource Planning and Management Committee interactive process evolve?

About forty-five miles south of here, the Kissimmee River flows out of Lake Kissimmee and runs southward through the heart of Central Florida before emptying into Lake Okeechobee. Once a pristine, serpentine river that meandered 90 miles on its journey, the river was channelized in the 60s to provide flood protection for growing communities around Orlando. The Kissimmee was turned into a 48-mile long canal whose water flow is regulated by a series of locks and water control structures.

In the early seventies, concerns were voiced about the serious environmental impacts of channelization. Drainage in the basin had resulted in the loss of approximately 40,000 acres of wetlands! Those who would fill in the ditch and those supporting the status quo were gridlocked.

In response to this developing storm of protest, then Governor Bob Graham created the Kissimmee River Resource Planning Management Committee and charged it with the complicated task of working with local, regional, state and federal governments as well as diverse private interests to develop a resource management plan for the area.

Specifically, the Committee was responsible for "reviewing land use problems, analyzing existing plans and programs and recommending improvements...". Issues to be addressed by the Committee included land use management, land acquisition, water quality protection and economic development. Beyond the review and recommendation on these issues, the Committee was further asked to evaluate the adequacy of local government comprehensive plans and zoning ordinances. Membership on the Committee included local politicians, an alphabet soup of federal, state and regional agency personnel, environmentalists, dairy farmers, ranchers and recreational interests. Not surprisingly, given the scope of its charge, its make-up, and the climate surrounding the Kissimmee channelization, the committee embarked on its mission in an atmosphere of classic conflicts--development vs. environment; state oversight vs. local autonomy; property rights vs. regulation.

To overcome the potential for the Committee to become immobilized and polarized, Chairman Timer Powers, then a Governing Board Member at the South Florida Water Management District, asked Dr. Pat Bidol, a recognized expert in the areas of dispute resolution and organizational behavior, to facilitate committee deliberations. The procedure created by Dr. Bidol to accomplish this task was the interactive planning process, a systematic approach to elicit diverse opinion and develop acceptable consensus.

The process used by the Committee was based on several considerations:

1) The broad range of interests, goals, and values of the Committee had to be carefully considered in developing management plans.

2) The key issues were complex problems about which limited and conflicting information was available.

3) It was acknowledged that the Committee's plan would require costly and irreversible commitments.

4) Committee members agree to engage in free-flowing discussions and "bargaining" so that the plan would represent diverse interests.

The procedure facilitated the sharing of information, the consideration of a host of interests, and fostered the development of trust between Committee Members. Dr. Bidol guided the interaction without influencing the content of the Committee recommendations.

The process was based on a three-stage model:
An identification state where key issues and options were established;
An evaluative state where social, political, economic, environmental and technological impacts were assessed; and,
A selection stage where "bargaining" between Committee members resulted in group consensus and the adoption of a final plan.

The plan, submitted to the Governor in August, 1985, was hammered out during 26 heated and often divisive Committee Meetings over a twelve-month period. Its objectives--to improve water quality throughout the basin, protect resources while promoting economic development, preserve the values of the Kissimmee River system, and bring under public ownership those lands that could not be managed through planning and regulation. These objectives were supported by specific recommendations and action plans that are being carried out today.

Our success in being able to move forward on the committee's recommendations is testimony to the effectiveness of the process. By recognizing the concerns of all Committee Members and interested citizens and by allowing decisions to be made through negotiation, all interests were able to have a stake in the plan. This balancing of interests has been vital to public acceptance and implementation of the plan.

The success of this process has given the South Florida Water Management District a new tool to effectively guide our stewardship of South Florida's land and water resources.

Crisis has been a catalyst, a challenge, an opportunity. But it is my hope that crisis will not always be the only impetus to action, rather that environmental knowledge, problem solving, values and sensitivity can become so totally assimilated into the fabric of our decision making that addressing them in a constructive and protective manner will come as regularly as breathing.

Dedication, innovation, risk-taking, public involvement and consensus building. I believe both of our organizations must have a solid commitment in these areas. As we move forward to the challenges of the 21st Century, I trust that you and those whose lives you touch will be there with the District and that our mutual investment will pay invaluable dividends by protecting the health and viability of our natural and urban environments. Together we can influence and take charge of our future. Environmental values can and will become integral to policy development.

V. ABSTRACTS

EDUCATION FOR A HUMAN WORLD ORDER: THE RESPONSIBILITY OF ENVIRONMENTALISTS

Susan Kains Ahearn
S.U.N.Y. at Stony Brook
Stony Brook, NY

The presentation focuses on the various approaches to peace education, highlighting World Order Inquiry and Bioregional Education. Activities will be presented that are appropriate for use in teacher education programs and experiences of their implementation at Stony Brook University will be discussed. The responsibility of environmental education during this period of societal transition will be interwoven with the search for global justice and environmental sustainability.

EDUCATE THE CHILDREN: CHANGE THE FUTURE BY USING HANDS-ON ENVIRONMENTAL EDUCATION TECHNIQUES

Judy Kosack Althouse
Miami County Day School
Miami, FL

Students must be made aware of the environmental and wildlife crises of today. With positive education through process approach, hands-on activities, children can easily be exposed to this in a non-threatening way, and the cause, ignorance of nature's fragile balance, may be reduced. Learn how children and their parents are changing their attitudes about nature and wildlife through hands-on activities which can easily be incorporated into any existing science curriculum. Proven ideas from an award-winning environmental studies program will be shared.

This program emphasizes laboratory and greenhouse experiences for each student through a living laboratory on campus, an abundance of plant specimens, and supplemental field trips into the Everglades, Biscayne Bay, and the Atlantic Ocean.

All teaching in the program is through experiential learning. The students are guided through self-discovery methods in a sequential curriculum using manipulative materials, discussion and discovery.

INTERNATIONAL TEACHER INSTITUTES - A GATEWAY TO UNDERSTANDING INTERNATIONAL ENVIRONMENTAL PROBLEMS, OR A WAY TO WASTE TIME AND MONEY?

Ray E. Ashton, Jr.
Massachusetts Audubon Society
Lincoln, MA

Americans are constantly barraged by reports of disastrous international environmental problems such as rain forest deforestation, desertification, extinction, and abuse of marine environments. However, few classroom teachers have the training or experience to understand these problems or the unique ecological communities, the cultural and economics related to these environmental problems. Often this lack of knowledge and understanding often leads to over simplification and less than fully effectual teaching in the classroom on these topics.

International teacher institutes are being offered by many organizations and travel companies. Most of these give participants an opportunity to experience cultures and ecological communities first-hand. However, just visiting a community in a passive way provides a very limited experience. Institutes should provide experiences that lead to a greater understanding of environmental problems, instruct and use techniques on how to study and measure various ecological parameters and help teachers develop activities for classroom use. After a review of many institutes being offered, it was found that few offered these opportunities.

The purpose of this workshop is to review methods of how to select travel programs, discuss methods that can help participants prepare for such programs, and to outline some of the activities that teachers can use with their students which lead to an understanding of international environmental problems.

RIVER TIMES: 400 YEARS OF INTERACTION BETWEEN HUMAN CULTURE AND A RIVER

Teresa M. Auldridge
Amelia, VA

RIVER TIMES is a set of 31 environmental education activities for grades 4-9 focusing on the James River in Virginia. Some activities deal with the cultural history of the river basin from 1607 to the present, while others focus on the ecology and geology of the river. A final section involves discovery of how political and economic concerns as well as environmental issues shape the management policies affecting the James and other rivers.

This guide was developed using a grant from two sources. The first was Richmond Renaissance, a bi-racial partnership founded in 1982--blacks and whites from both business and government who have joined together in a new spirit of cooperation. The second was the Virginia Environmental Endowment, a grantmaking foundation whose purpose is to improve the quality of the environment in Virginia and fund programs related to water quality in the Ohio and Kanawha River Valleys.

Teachers worked cooperatively to research the history, geology, ecology, and environmental problems related to the region. The Project Director adapted activities from Project Learning Tree, Project WILD, OBIS, and several ERIC/SMEAC activity books to convey the specific information and concepts appropriate to the topic. The overall theme of the guide is that human civilizations have long been influenced by their environment and have influenced it in return. Native Americans had relatively little impact upon their environment. However, European colonists in North America quickly began altering the landscape and as their numbers and technology increased, their influence on the environment in general and rivers in particular brought about steady decline. Changes in the attitudes of the present culture over the past century are also emphasized for students and several activities focus on identifying students' own responsibilities and powers in relationship to the environment.

The presenter of the session will give specific details about the project's development suggesting ways for replication by others.

TOURISM, ENVIRONMENTAL EDUCATION AND CONSERVATION IN THE TROPICAL RAINFOREST

Paul Beaver
Amazon Conservation Commission, Inc.
Indian Shores, FL

Tourism, the world's second largest industry, is growing rapidly in areas of sensitive environmental concern. Under negligent management, this growth can result in the over-exploitation and ruin of natural resources. If properly managed, tourists can be educated about crucial environmental issues and tourism revenue can be directed to fund a range of conservation projects.

While this situation has been realized and acted on in many cases in North America, only rarely have we seen any relation between tourism, environmental education and conservation in the tropical regions of the world. The tropics contain the richest habitat, in terms of species' diversity and abundance, and the poorest countries. Fueled by the poverty and high birth rate, there is enormous economic pressure to exploit natural habitat in these regions. Tourism is currently the only economic argument on behalf of conservation in the tropics.

The Amazon Conservation Foundation was founded to promote conservation in the Amazon of Peru, specifically through the industry of tourism. The Foundation provides for environmental education of North American tourists, natives, and funds conservation projects with tourism revenue.

WATER QUALITY MONITORING NETWORK - THE THIRD YEAR

Bernard W. Benson, University of Tennessee
Devonda Eiklor, Sullivan South High School
Don Daugherty, Sequatchie County High School
Clark Cathey, Glencliff High School
Barbara Levi, Soddy Daisy High School
Raymond Bentley, Jackson County High School

Twenty teachers and 40 students from the Tennessee Valley region are now participating in the Water Quality Monitoring Network. This project is sponsored by the Tennessee Valley Authority and is administered through the environmental education center at the University of Tennessee at Chattanooga. The project provides and/or supports instructional workshops, water testing equipment and instruction materials, consulting, professional travel expenses, and a summer water camp. Teacher/student teams develop instructional materials on water quality and conduct research projects in their respective communities.

This presentation will focus on reports by first year teachers in this program. They will present summaries of their research projects and describe or demonstrate the instructional products they developed.

A STUDY OF THE CHANGES IN KNOWLEDGE & ATTITUDE TOWARD SEABIRDS

Louise LaBarre
Atlantic Center for the Environment
Ipswich, MA

A study was conducted in 1988 to determine changes that had occurred among Quebec fishermen in knowledge, attitudes, and behaviors toward seabirds as a result of long-term conservation programs that address an illegal harvest problem. Comparisons were made to a 1981-82 survey, which showed 94% believed it was acceptable to hunt seabirds for food needs, 65% held misconceptions about seabird laws, and 74% illegally harvested birds and eggs. Results of a childrens' survey showed similar changes in knowledge and attitudes. The relative effectiveness of various educational strategies tested over a ten-year period is discussed. This project involves the collaboration of several Canadian conservation organizations and is the subject of a documentary program for television.

CONSERVATION FOR CHILDREN

Marilyn Bodourian

A program designed to increase awareness, understanding and action of elementary school children. The program provides an opportunity for all students to gain basic knowledge in using natural resources and energy that will aid them in caring for our environment.

SAVE OUR SPRINGS

Lisa K. Byrd
Johnell Hankins
Hudson Middle School
Hudson, FL

The Save Our Springs (S.O.S.) program offers seventh and eighth grade students an opportunity to study Florida "in the wild". This valuable three-day workshop will take students to Manatee State Park, where they will become acquainted with the ecological forces that affect Florida's springs. Students will gain a greater understanding of the relationship that exists between man and the environment. In addition, they will study man's impact on the ecology of Florida's springs.

Activities in the field will include: 1) Compass and map studies; 2) Wildlife conservation; 3) Exploration of Florida's wetland community; 4) Collecting and observing plants and animals; 5) Environmental studies; 6) Outdoor ethics.

It is our belief that in order to have a well-rounded education, one must leave the confines of the classroom to enlarge one's perspective. This belief becomes reality in the S.O.S. workshop.

UNRAVELING THE WEB OF FINANCIAL DEVELOPMENT

Virginia M. Caruso
Caruso & Associates
Gainesville, FL

Clint L. Shepard
University of Florida
Gainesville, FL

This is an era where private contributions are important to maintain programs or to move ahead with creative ideas. Are you getting your share? This session is designed to discuss concepts and techniques instrumental for formulating an organizational-based fundraising proposal. Fundamental principles, philosophy, and practical ideas to assist in developing a successful financial development plan are presented.

RESPECTING DIVERSE VALUES WITHIN CULTURES THROUGH ENVIRONMENTAL EDUCATION

Cheryl Charles
Project WILD
Boulder, CO

Cultures are characterized by their values. Education about the environment--personal, cultural, ecological, and global--provides an opportunity and a responsibility to address values and beliefs. Some values and beliefs held by the members of a society may be in conflict with those held by others within the society. How can we as environmental educators contribute to a process of education that is constructive, rather than destructive? How can we help to increase the options available to decisionmakers? Can we minimize polarization of views, offering models for communication and cooperation that recognize and honor diverse values within a culture? As environmental educators, it appears that we can benefit from examining our approaches to the study of value-sensitive issues; clarifying the circumstances in which our values are made explicit and where implicit; establishing guidelines for balance and fairness to assist teachers and workshop leaders when addressing value-sensitive topics; and articulating a philosophical perspective to guide the process of education through value-rich waters.

Using Project WILD as a focus--including the new Project WILD Aquatic Education Activity Guide--this session will raise questions and examine one approach to honoring diverse values **within** a culture--both in the United States and in Canada.

A UNIVERSITY-WIDE RECYCLING PROGRAM: THE AGONY AND THE ECSTASY

Thomas B. Cobb
Bowling Green State University
Bowling Green, OH

A voluntary recycling effort begun two years ago by a small group of motivated environmental students at BGSU has developed into an extensive program which now includes all areas of campus as well as some parts of the surrounding community. While the majority of effort is directed toward aluminum, some paper and glass are also being recycled. In addition to the direct benefits of litter reduction and resource recovery, the activity has been successful in producing a meaningful focus for the environmental student club, has attracted state-level funding, and has helped to promote environmental awareness among the campus community. It also has served to improve cooperation between the university and the city. Although 20% of the aluminum beverage containers used on campus are now being recycled, the program has not yet succeeded in recovering a significant fraction of other recyclable materials, is far from being self-sufficient financially, and has not yet been fully integrated into routine campus support services. The program also has created some administrative conflicts, and has added unusual service obligations to an academic area of campus life. This combination of successes and failures provides an object lesson from which we think others may benefit. Specifics of the program, its method of operation, and suggestions for replication in other areas will be presented.

NETWORKING FOR IMPROVED ENVIRONMENTAL EDUCATION AND RESEARCH

Thomas B. Cobb
Bowling Green State University
Bowling Green, OH

Networks between public school teachers and environmental professionals can be used effectively to enhance the quality of environmental education within the school setting as well as provide an efficient means of obtaining data necessary for environmental assessment. Such a network has been established between the Center for Environmental Programs at BGSU and high school science teachers in northwest Ohio. Participating teachers and students are involved through the sampling of water quality in local streams. Raw data are transmitted by computer link to the environmental center at BGSU. These data are compiled and analyzed at BGSU, and the collective results are made available to the participating teachers and their students through the same service. Most activities involve the collection and sorting of macro invertebrates using a schema developed by the Ohio Department of Natural Resources. Some groups also are involved in more detailed microbiological and chemical analyses of collected water samples. The collected data are being used by the environmental center at BGSU to provide longitudinal analysis of water quality in the region. The program offers a substantive means of interaction between the public schools and the university, provides a meaningful focus for science activities in the field by the teachers and

students involved, and simultaneously generates a significant data base of benefit for the entire region. Procedures used to establish such a network and the successes and failures encountered to date will be discussed.

EXPEDITION EDUCATION: MAKING THE HEALTH OF PLANET EARTH COMMONGROUND

Michael J. Cohen
National Audubon Society
Sharon, CT

This session explains the workings of an ongoing, accredited, graduate and undergraduate experiential, cross-cultural, outdoor program which recognizes Environmental Education to be the process which aids humankind in developing unifying behavior that is congruent with maintaining the Earth as a living organism. In this program: 1) Plant Earth is seen in its entirety as a living organism; 2) Nature and human nature are one and the same; 3) People are an organ of the organization of the Earth; 4) All elements of the Earth-organism system are interrelated; 5) Our culture, language and symbols are recognized as presently inadequate to explain the Earth as a living organism and that people are part of that organism. A functional communication is developed which incorporates people, nature, culture and the planet as interchangeable terms; and 6) Sensing the totality of the Earth as a living system involves sensing the wholeness of yourself.

The translation of this working definition of Environmental Education into action involves attention to: skills, values, perceptions, feelings, behavior and knowledge blended into a working wisdom of thought and action which is congruent with the definition and which leads to personal, interpersonal and global balance.

POPULATION, RESOURCES, AND THE ENVIRONMENT

Kimberly Crews
Population Reference Bureau
Washington, DC

Rapid population growth is not the cause of resource depletion or other environmental problems, but it does contribute to the seriousness of these problems and makes solutions difficult to attain. An understanding of population dynamics is necessary in order to make informed decisions about resource use and to provide workable solutions to environmental problems.

This workshop will acquaint teachers with current world and population trends and show how these trends are related to the environment and resource use. The issues covered will range from the contribution of rapid population growth to environmental degradation to the relationship of population change to resource use and food production. The U.S. population situation and trends will be covered within the world picture.

The information will be delivered via participatory activities such as simulation, and chart and graph analysis in small groups, among others. Emphasis will be placed on accurate data and trend analysis, rather than on unsubstantiated opinions.

MUSIC AND SONGS TO PROVOKE ENVIRONMENTAL AWARENESS AND CONCERN

Dale Crider & Linda Crider
Florida Game & Freshwater Fish Commission
Gainesville, FL

Original lyrics and music are used to present environmental issues to the public of Florida through concerns and presentations. Endangered species and wetlands protection are addressed musically and narratively. Synchronized twin projector slides provide visual meaning to the songs.

The power of songs is multicultural and this multimedia approach is informative and entertaining as well.

EARTH EDUCATION: LEARNING TO LIVE LIGHTLY

Sarah Davis
Institute for Earth Education
Boynton Beach, FL

Earth Education is the process of helping people live more harmoniously and joyously with the natural world.

Over the years, we have come to realize that collections of supplemental activities are not enough to do this terribly important job of changing people's view of the earth. Earth Education programs are carefully-crafted, focused learning adventures which build ecological understandings, heighten feelings for the natural world, and provide time for contemplating both. Our programs do not end when the participants go home, but provide opportunities for ongoing efforts to live more harmoniously with the earth and all its life.

A PROTOTYPE FOR COMMUNITY EE: THE DADE COUNTY ENVIRONMENTAL STORY

Don Deresz, Sande Ross, Pat Suiter
DCPS Center for Environmental Education
Miami, FL

The Dade County Environmental Story was designed as a resource guide to Dade County's (Florida) natural and human systems--past, present, and future. A primary objective of the book is that it enables teachers to view the County's environment and the students who live and participate in it as interacting parts of a natural, and human, system.

The book has four sections that provide: an interdisciplinary look at the major natural areas in and around the County; a review of the County's multicultural history and the interactions people of Dade County have had with their natural environment; the student's view of their own school and home as little environments and the presentation of the abiotic/biotic/cultural interrelated triangle; an awareness of the environmental concerns of Dade County; and examines planning as a constructive link between the present and the future.

A multitude of interdisciplinary student activities are integrated throughout the book. The activities not only incorporate the "skill subjects", but also aim to nurture the sense of wonder found in most young people, to foster sensory and emotional responses to the beauties of environment, and to suggest satisfying, creative ways of expressing their feelings.

This will be a working session where participants will take a close look at what **The Dade County Environmental Story** has to offer as a teaching tool and as a prototype for their own respective communities.

PROFESSIONAL ECOLOGISTS AND ELEMENTARY EDUCATION: NEW INITIATIVES AND SPECIFIC EXAMPLES FOR NORTH FLORIDA

Peter Feinsinger and Maria Minno
Department of Zoology, Gainesville, FL

Linda Cronin, College of Education
University of Florida
Gainesville, FL

Educating children in ecological biology, here defined as the study of animals, plants, and their interaction in natural surroundings, (a) serves as science education broadly speaking, by involving quantification, the process of scientific inquiry, and a wide range of tools and skills; (b) contributes to environmental education; (c) educates children about the plants, animals, and habitats they encounter in their daily lives. The Ecological Society of America (ESA), the society of North America's practicing ecologists, has recently acted to increase academic ecologists' input into education programs at all levels, especially elementary school. The presenters will discuss current initiatives, and will invite suggestions on ways in which professional ecologists could usefully interact with NAEE or its individual members. One approach, developed in north-central Florida and elsewhere, is "ecological biology through local natural history". This involves guidebooks to plants and animals commonly found in local elementary schoolyards and especially appropriate for investigating current ecological concepts. A guidebook gives non-technical information on natural history of each entry, and its interactions with other organisms. Also under development is a curriculum of 50 hands-on activities, at the Grade 4 level, that apply scientific inquiry (including hypothesis testing) and up-to-date concepts in ecological science to locally available, robust plants and animals. The curriculum highlights ecological and behavioral interactions between very different organisms such as plants and leaf herbivores, plants and seed slayers, plants and pollinators, plants and fruit-eaters, insect predators and prey, or spiders and their food animals.

EPA'S ENVIRONMENTAL MISSION--TODAY, TOMORROW...

Cece Forget
U.S. EPA
Denver, CO

The Environmental Protection Agency's regulatory responsibilities for enforcing Congressional mandates, often place the Agency in a reactionary mode. Nevertheless EPA, recognizing the value of an informed public, is committed to increasing awareness and understanding of environmental concerns. With a visionary outlook, EPA cooperates with professional educators to convey respect for and sensitivity to the eco-system through an environmental ethic in today's youth.

This session will begin with an overview of EPA's Congressional mandates. An overview of EPA's EE resource materials and the President's Environmental Youth Award will follow, reflecting environmental education TODAY, at EPA. A "future-problem-solving" exercise will provide a look into the future at EPA and the field of environmental education.

THE COMMUNITY IMPACT PROGRAM

Kathleen M. Giegel
Giegel's Programs and Designs
Portersville, PA

Participants in this workshop will gain an insight to the Community Impact Program by a hands-on experience with the techniques used in this program.

The program is divided into two parts: Part 1--Methods & Simulations (9th); Part 2--Planning & Development (10th).

In Part 1, students will be introduced to a simulated community, the people, the businesses, local government, techniques of detecting environmental impact on natural resources, what has been and what is predicted for the community's future.

In Part 2, students using the information learned from Part I will become oriented with their own community in which they reside. Community impact statements will be prepared, community history, businesses, local natural resources and energy methods, etc. allowing the students to take an active role in their community and make an effort to better the future of it.

EXPANDING ENVIRONMENTAL EDUCATION HORIZONS WITH LIVING HISTORY

Marion Giroux
Carla Lucas Taylor
Gwinnett Co. Park & Recreation Dept.
Buford, GA

This presentation will describe the current efforts of the museum staff, through costume, demonstration and ingenuity, to blend Environmental Education with local history.

The Museum is located in an area that is rich with Native American and pioneer history. We are also fortunate to have, on site, an 1818 log cabin built by the Cherokee. This cabin played an interesting role in civil war history. We have incorporated this cabin and its history into our program offerings.

INSECTS ARE 99% OF ANIMALS SPECIES: USE THEM TO TEACH ECOLOGY AND EVOLUTION

Deborah S. Green
Apopka, FL

Audiovisuals, live insects and other resources for teaching about insects and for teaching ecology and evolution using insects as vehicles will be presented.

DOES ENVIRONMENTAL ACTION HAVE A PLACE IN THE SCHOOL CURRICULUM?

William F. Hammond
W. Vancouver, BC, Canada

The presentation will review twenty years of working with public and parochial school students in environmental action programs. The Lee County Schools Monday E.E. Seminar program will be reviewed as to the goals, strategies, and tactics that have guided this internationally recognized E.E. action program. In addition, a report on a literature review of the topic, and a North American search for those educators conducting E.E. action programs, will be shared.

The program will be presented in a multi-media format and emphasize why E.E. action programs have value in a democratic society, what the ideal program components appear to be, how a program can be instituted and maintained, and indeed, transferred.

CRANE CONSERVATION AND PUBLIC EDUCATION IN EASTERN ASIA

Jim Harris
International Crane Foundation
Baraboo, WI

Le Dien Duc
University of Hanoi
Vietnam

Wetlands are heavily used by people in eastern Asia, and both wildlife and people suffer as these productive habitats are destroyed or degraded. Six of the region's eight species of cranes urgently require conservation efforts. Because of the prominence of cranes in Asian cultures, peoples of many countries have cooperated on crane and wetland protection efforts that benefit a host of animals in addition to cranes.

Conservation depends on involvement and support of the local people, and effective programs must focus on their needs. This presentation will concentrate on China and Vietnam, and on how public education and resource management are inextricably connected.

A VIDEO UNIT ON THE SURFACE HYDROLOGY OF SOUTH FLORIDA

Bill Haynes
Fort Lauderdale High School
Fort Lauderdale, FL

For thousands of years, a unique combination of south Florida hydrology, geology, and climate interacted to create a diverse natural ecosystem unique in all the world. As man flocked to south Florida to take advantage of his natural wonderland and all it had to offer, he began a process of alteration that threatens to destroy the very features and advantages he was seeking. Unfortunately, because of our collective lack of understanding of the ecology of this wetland, our water management decisions disregarded the needs of the natural system. The resulting deterioration threatens to destroy the system we love so much.

This video-tape presents a comprehensive surface and aerial video of the man altered surface hydrological features that now impact the wetland and esturine ecology of south Florida. This video-tape is a private, non-profit effort to provide students, teachers, and schools with a tool designed to increase awareness of the needs of our natural wetland system. Included with the program is a reference packet of materials.

THE STORY BEHIND THE STUMP: ACCOMPLISHING MULTIPLE USE OBJECTIVES THROUGH THE CUTTING OF TREES ON GREEN MOUNTAIN NATIONAL FOREST

Thomas R. Hudspeth
University of Vermont
Burlington, VT

National Forests in the Pacific Northwest and the Southeast are managed primarily for their timber--to provide wood and pulp for paper. However, on Green Mountain National Forest in Vermont, the main reasons for cutting trees are to provide (1) dispersed recreation opportunities, (2) wildlife diversity, (3) visual quality, and (4) high quality sawtimber.

Recent Forest Service EE and interpretation efforts have been directed to helping accomplish management objectives. This process involves environmental educators as integral members of interdisciplinary resource management teams. Such efforts involve cooperation between colleges/universities and Forest Service personnel.

The Story Behind the Stump; involves a slide show, exhibit, self-guided auto tour, pamphlet, background information ("fact sheets") and a curriculum unit for 5th and 6th graders which has been field tested in schools near Green Mountain National Forest. The management issue it addresses is: why and how trees are cut on the Forest.

USING MASS MEDIA FOR NATURAL RESOURCE EDUCATION IN MALAYSIA

Susan K. Jacobson
University of Florida
Gainesville, FL

A survey of mass media in Sabah, Malaysia revealed a weekly average of only two newspaper articles and one hour of television viewing time devoted to natural resource conservation topics. To address the need for greater environmental coverage, a series of newspaper articles was produced in 1985 for the Sabah Park System with the goal of increasing public interest in the parks. Although lack of prior data precluded an assessment of changes in park visitation rates, secondary effects such as phone calls from politicians and the business community suggest print media would be an effective way of reaching specific audiences with environmental messages in Sabah.

THE EFFECT OF SCIENCE-RELATED SOCIAL ISSUES INSTRUCTION ON SIU-C'S PRESERVICE TEACHER ABILITY TO TEACH S-T-S ISSUES

Shahrir Jamaluddin
Southern Illinois University
Carbondale, IL

Research indicates that instruction dealing with science-related-social issues is a powerful instructional tool. The success of such instruction is typically dependent on the skill of the teacher using the issue instruction methodology. This presentation will report data which evaluates a science methods course at Southern Illinois University--Carbondale designed to enhance the knowledge and skills critical to the issue instruction methodology in preservice teachers.

A pretest-posttest, pre-experimental design was used with two sections of an elective science methods class (n=36) using a fifteen week instructional format. The study assessed students' (1) knowledge of and skills in the use of specific issue instruction techniques, (2) perceived knowledge of and skills in the use of specific issue instruction techniques, and (3) responsible citizenship behavior associated with issue resolution. An instrument, the Science-Related Social Issue Teaching Skill Inventory, was developed to collect data on the variables of the study.

THE VANISHING RAINFORESTS: GLOBAL ENVIRONMENTAL EDUCATION MATERIALS

Jill Jarboe
Pine Jog Environmental Science Center
West Palm Beach, FL

A slide presentation will be given about the rapidly disappearing tropical forests. These wild places contain a majority of the species of plants and animals of Earth, so their destruction means the extinction of most life forms. Other reasons for their importance will be given, as well as ways to help in the movement to preserve them.

Teaching materials will be provided for lessons on this subject. The availability of audio-visual aides for the classroom will also be discussed.

The presenter spent 11 weeks in the Amazon region of Peru. The presentation will be a combination of personal experience as well as information and materials from both national and international conservation organizations.

Grade levels: middle school, high school, college, some adaptation for 5th grade, general adult.

MUSIC AND DRAMA FOR ENVIRONMENTAL EDUCATION

Jill Jarboe
Pine Jog Environmental Science Center
West Palm Beach, FL

Songsheets and plays will be distributed. Subject matter deals with endangered species, plants and animals, interrelationships, etc. all taught in a fun way. These materials have already been successfully used around the state of Florida as well as in New Jersey, California, Colorado and other states. Some handy tips in putting on a play will be discussed.

TEACHING NATURE THROUGH STORYTELLING

Patricia Kane
New Jersey Audubon Society
Bernardsville, NJ

An innovative way to capture the imagination and open the doors to the natural world. Examples of children's poetry, fairy tales, folk tales and legends will be used as a springboard to teach a wide range of natural science concepts with sample lessons used successfully in classroom and nature centers for the past ten years.

Used with children ages four to 11.

THE FLORIDA COUNCIL ON COMPREHENSIVE ENVIRONMENTAL EDUCATION (FCCEE)

Randy Lewis, Chair, FCCEE
Madeline Strong, Chair, Interagency
Environmental Education Coordinating
Committee, (IEECC)
Irene Hooper, Chair, Task Force,
Community Environmental Education
Coordinating Committee (CEECC)

Functioning with little support or direction since the early 1980s, environmental education in Florida took a dramatic leap forward with the formation of the Florida Council on Comprehensive Environmental Education (FCCEE) in 1986.

The 15-member Council, with representatives from state agencies, the business and conservation community, and the formal education sector, serves as an advisory body to the Commissioner of Education, the State Board of Education, and the Legislature on matters pertaining to environmental education.

Based upon an analysis of past and current environmental education programs, the Council produced the "Comprehensive Plan for Environmental Education" in 1987. A two-phase implementation strategy recommended actions that the FCCEE, Department of Education, school districts, and state agencies should take to provide environmental education opportunities for Florida residents and visitors.

A similar coordinating effort for non-formal environmental education programs in Florida is currently being considered by the Community Environmental Education Coordinating Committee (CEECC) task force. The diverse efforts of community organizations such as scouts, 4-H, YMCAs, environmental groups, and private corporations need recognition and coordination and it is hoped that the CEECC will serve to encourage and facilitate these activities. A large part of this discussion period will focus on establishing the CEECC in Florida.

NATURE TEACHES: ONE OPTION FOR LIFELONG LEARNING

Marylin Lisowski
Eastern Illinois University
Charleston, IL

Current trends indicate that there has been an increase in the use of parks, wilderness areas, and the outdoors for varying forms of recreation. However, leisure use is not the only value inherent in the natural environment. The potential for learning is immense. Several programs are available for adult learners and educators that focus on teachable moments. Travel programs with a natural history orientation can serve as a vehicle by which science content can be updated and/or introduced and instructional strategies can be modeled. This session will highlight nature travel programs that are designed to meet the needs, preferences, and schedules of teachers. Sample itineraries will be reviewed, previous experiences will be shared, and future programs will be described. The presentation will cover local as well as international programs.

COOPERATIVE LEARNING: IMPLICATIONS FOR ENVIRONMENTAL EDUCATION

James D. Lubbers
East Carolina University
Greenville, NC

Cooperative learning is a proven technique of student interaction to increase achievement, improve attitudes and develop socialization skills, particularly among students of widely varying backgrounds and abilities. This techniques is widely applicable but is especially useful in role playing environmental issues where different and often opposing viewpoints are represented.

Students can develop socialization skills through such activities by practicing listening and communication skills in a cooperative learning atmosphere. Also, learning to acknowledge and understand opposing views and perspectives can help students evaluate their own attitudes about environmental issues.

THE NAEE MASTER PLAN

Edward J. McCrea
President of NAEE
Fairfax, VA

NAEE is in the process of preparing a master plan to guide activities of the Association over the next five years. As NAEE has grown, it has become increasingly apparent that it was time to consider some of the basic ways we do business in order to insure that we could continue to provide the necessary support and activities for our members.

The process of preparing the master plan has included the formation of a planning committee with specific subcommittees charged with producing sections of the plan on NAEE's history, present activities and services, assessment of member's needs and interests, and development of long-range goals and objectives with strategies to meet these new targets.

During this presentation, Planning Committee members will present a draft of the master plan for comment and will discuss key proposals it contains. Opportunities will be included for additional input into the plan before it is made final.

THE REHABILITATION AND RELEASE OF EXOTIC WILDLIFE IN SOUTH FLORIDA

Brian Mealey
Museum of Science
Miami, FL

During the past three decades South Florida has been blessed/cursed with the introduction of many non-native (exotic) species of wildlife. Many of these exotics are well established and successfully breeding in their newly adopted environment. Injured exotic wildlife is becoming extremely prevalent in rehabilitation centers. With the influx of these new species, South Florida rehabilitators have a serious dilemma. Should these animals be released, placed in educational institutions or be euthanized? When is it ever justified to release an exotic species? There is no simple answer to any of these questions. Solutions to many of the questions involving exotics depends on the philosophy of a particular facility. Unfortunately, many philosophies are determined by personal goals without truly understanding the ecological needs of the environment. This presentation will discuss the benefits, problems and potential solutions for the rehabilitators who are posed with the quandary of exotic wildlife.

THE NORTH CAROLINA CENTER FOR THE ADVANCEMENT OF TEACHING: INTERDISCIPLINARY SEMINARS IN ENVIRONMENTAL EDUCATION FOR TEACHERS

Walter P. Oldendorf
Wester Carolina University
Cullowhee, NC

The North Carolina Center for the Advancement of Teaching was established by the North Carolina legislature in 1985 to provide opportunities for North Carolina teachers to explore advanced topics in the arts, humanities, and sciences. This mandate is accomplished in part by offering interdisciplinary seminars to teachers in all fields and all grade levels, about 2500 of them so far. This presentation will focus on two seminars which emphasize the interactions between humans and their environment. **Humans versus the Environment: The Florida Experience** is a week long exploration of the question: Can a balance be achieved between the intensity of development and the interests of conservation in the South Florida ecosystem. **Humans on Earth: The Blue Ridge Experience** explores the interactions between humans and their environment in the Blue Ridge region through an interdisciplinary study of the geology, geography, history, culture, biology, and sociology of the region. Both seminars bring together people of diverse backgrounds and interests both as participants and presenters in an effort to clarify issues and values surrounding environmental controversy. Slides, discussion of future seminars, and evaluation results will be included.

HAZARDOUS WASTE: WHERE IS IT GOING AND WHY?

Margaret G. Ottum
Johnston State College
Johnson, VT

The United States produces over 250 million tons of hazardous wastes a year and what ultimately happens to it raises serious environmental, health, and ethical questions. In recent years there has been a steady move toward stricter governmental control of disposal methods and facilities, coupled with increased liability for nonconformance, and increased public opposition to siting new facilities. All of this has resulted in a greatly increased movement of such hazardous wastes long distances often across state and international borders.

Unfortunately much of this movement is toward "places of least resistance", places with the least regulations, the least enforcement, the least knowledgeable neighbors, and often the least technology and economic base to deal with problems when they do occur. Internationally such wastes move from industrial to Third World countries.

After a look at the international movement of hazardous wastes, a detailed look at Vermont's hazardous waste manifests provided the bases of assessing where it goes when a state has no hazardous waste disposal facilities of its own and no likelihood of establishing one in the near future. This is a situation common to the New England states and quite a number of others.

YOUTH AT RISK: AN ENVIRONMENTAL EDUCATION SUCCESS STORY

John Padalino
Pocono EE Center
Dingmans Ferry, PA

A description of the implementation and evaluation of a unique program designed to provide 200 "At Risk Youth" from the New York City public schools with a residential environmental education experience during a Summer enrichment session. This presentation is a status report on the first year of a three to five year initiative.

OUR FOREST, THEIR FOREST

John H. Parker, Suzanne Koptur, Thomas Pliske
Florida International University
Miami, FL

This environmental education project focuses on the need to understand and conserve local forests as well as environmentally-threatened tropical forests. It involves the development of (1) a detailed "how to" manual for the successful creation of a small forest or native plants at a local elementary school, (2) a curriculum guide that emphasizes the use of the schoolground forest for hands-on scientific observation and experimentation and ecological and botanical comparisons of the local forest with those of a tropical forest, and (3) a model information-exchange program between the local elementary school and a school in a country which has tropical forests. This exchange could include (a) a cooperative effort to establish a small planting of vegetation representative of a tropical forest on the grounds of the school in a tropical country, (b) a sharing of the activities involved in the planting and maintenance of the two "forests" and comparisons of their ecological and botanical characteristics, and (c) the translation of this exchange information into the language of the tropical country (probably Spanish) and vice versa.

A NATIONAL NETWORK FOR ENVIRONMENTAL EDUCATION

John Paulk
NNEE
Knoxville, TN

Consistent with the social and economic goals of the United States, a coalition of governmental, academic, environmental and private sector organizations is establishing a National Network for Environmental Education (Network). A major initiative of the Network program will be the development of environmental education centers at colleges and universities throughout the country. These centers will provide expanded community-based environmental education outreach efforts aimed at both the "formal" (school) and "informal" (general public) sectors. Nationally coordinated management, information, and program support services will be provided to the centers. The Alliance for Environmental Education (Alliance) has taken the lead in developing the program.

POPULATION THEORY AND THE MODERNIZATION OF AGRICULTURE: IMPLICATIONS FOR ENVIRONMENTAL EDUCATION

John H. Perkins
Evergreen State College
Olympia, WA

The human population has grown by over two billion people in the past four decades, and, up to now, increases in agricultural productivity have been sufficient to support the current population of over five billion people. Hunger exists, but its cause is unequal distribution of food, not its physical lack. High yielding, capital intensive cereal production practices, sometimes called the Green Revolution, are the foundation for food production in both developed and developing countries.

Scientific research that led to high yielding practices received a major stimulus in the 1940s from the Rockefeller Foundation, which in turn was guided by a theory of overpopulation as the cause of hunger and starvation. The theory was misleading, both at the time of its origin and in its current renditions. Nevertheless, the theory spawned an extensive research network dedicated to increasing agricultural production through capital intensive technologies. The theory also served as a barrier to the exploration of alternative modes of ending hunger that were less dependent upon capital inputs.

Environmental educators must be aware of the origins and rationale for high-yielding agricultural practices if they are to explain the relations among agriculture, population size, and environmental quality.

AMERICA'S FUTURE IN TOXIC WASTE MANAGEMENT

Bruce Piasecki
Clarkson University
Potsdam, NY

Drawing upon the experience of ten European nations, this session presents a new plan for responding to the United States toxic waste challenge. The answer to treating wastes rests in the establishment of a more productive government-industry infrastructure. The session demonstrates the ways in which the European efforts to resolve the problem--both successes and failures--can act as a valuable guide to U.S. policy makers as they grapple with this central issue of the day. This work advances the public debate on the role of government controls in developing innovative environmental management strategies.

ENVIRONMENTAL AWARENESS AND A FLORIDA ELECTRIC UTILITY: A CASE HISTORY OF MUTUAL BENEFIT

Peter A. Quincy
Florida Power and Light
Juno Beach, FL

This slide-lecture presentation will focus on the environmental education and awareness role which a major electric utility plays in Florida. The utility provides a wide variety of opportunities for enhancing environmental education and awareness through the publication of many endangered species booklets, the production of several environmental films and the sponsorship of environmental awareness workshops and conferences. This utility also conducts endangered species (manatee, sea turtles and crocodile) awareness workshops and frequently presents programs on these species at conservation organization meetings, nature centers and schools.

The utility in its stewardship role has also provided many students and citizens with the opportunity to visit a freshwater cypress swamp with trained interpretive naturalists. All of these environmental awareness activities are provided free of charge and are examples of cooperation and actions to promote the beneficial use of utility lands and resources as well as illustrate the compatibility of wildlife resources and electric power facilities.

CARETAKERS OF THE ENVIRONMENT 1989: THE THIRD INTERNATIONAL CONFERENCE FOR HIGH SCHOOL STUDENTS AND TEACHERS ON TECHNOLOGY AND THE ENVIRONMENT

Edward C. Radatz
Oak Park and River Forest H.S.
Oak Park, IL

To help tomorrow's leaders understand how technology and environment affect global problems, 200 to 300 students will attend Caretakers of the Environment 1989. This conference on TECHNOLOGY AND THE ENVIRONMENT will provide a unique forum for examining issues, promoting international friendships, and developing leadership skills that are so important in business and world affairs.

In June 1987, the first Caretakers of the Environment Conference on THE SEA: POLLUTION AND PROTECTION was held in the Netherlands. In june 1988, Spain hosted the second conference on NATURAL AND CULTURAL HERITAGE.

In June 1989, the third conference will be hosted by the Pollution Control Center (PCC) of Oak Park River Forest High School in Oak Park, Illinois. This meeting on TECHNOLOGY AND THE ENVIRONMENT will include visits to Argonne National Laboratory, Fermilab, Johnson and Son, Nalco Chemical, Waste Management Corporation, the Museum of Science and Industry, and tours of Chicago and the Indiana Dunes. Speakers from the United Nations Environment Programme (UNEP), government, business, environmental, and research organizations will highlight issues.

THE EFFECT OF ISSUE INVESTIGATION AND ACTION TRAINING ON VARIABLES ASSOCIATED WITH ENVIRONMENTAL BEHAVIOR IN SEVENTH GRADE STUDENTS

John Ramsey
Southern Illinois University
Carbondale, IL

Responsible citizenship behavior has been cited as the ultimate goal of environmental education. Existing research examining the instructional effects of environmental education methodologies on responsible citizenship behavior is limited. Issue Investigation and Action Training (IIAT) is a methodology designed to enhance responsible citizenship behavior by teaching middle school students (1) how to investigate and evaluate science-related social issues and (2) how to identify and apply issue resolution strategies to help solve those issues.

A pretest-postest design was used with four experimental (n=64) and four control groups (n=85) during an eighteen week instructional format. Analysis of the data indicated that the following variables achieved statistical significance: overt citizenship behavior, individual locus of control, group locus of control, knowledge of action strategies, perceived knowledge of action strategies, and perceived skill in the use of action strategies.

The data indicated that IIAT increased citizenship behavior on the part of seventh grade students. Further, specific knowledge skills, and beliefs critical to responsible citizenship behavior were also significantly enhanced.

CORNERSTONE: ONE SCHOOL'S RESPONSE TO THE NATURAL WORLD

H. Bruce Rinker
Millbrook School
Millbrook, NY

A teaching zoo that accommodates more than 100 exotic and indigenous animals, a 600-acre campus near the Catskills and Berkshires with extensive forests and wetlands, and an intense curriculum with a strong ecological base are the markings of a school philosophically committed to the Natural World. Through its recent history the Millbrook School, a private secondary school with about 180 students, has been guided by its three philosophic cornerstones: Community Service, Global Awareness, and an obligation to the Natural World. This presentation discusses the implementation of the latter--the concepts, skills, experiences, and values integral to the move--as a model for other educational institutions. Schools with a sound educational breadth can provide young people with the requisite tools for confronting the issues of their world. Pasteur's statement that "In the field of observation, chance favors only the prepared minds" is both art and quintessential in any educational approach to the Natural World.

THE INNER CITY MARINE PROJECT (ICMP) BUILDS MULTICULTURAL WEBS THROUGH MAGNET PROGRAMS

Sande Ross
Inner City Marine Project
Miami, FL

The ICMP represents one effort of Dade County Public Schools, the fourth largest in the nation, to bridge the cultural gap for the tri-ethnic student population. Magnet summer school programs lure students from across the county into the inner city to participate in marine and environmental study programs and water recreation opportunities.

ICMP provides students in grades 4-12 year-round opportunities to experience educational and recreational activities related to the world of water, which could lead to fulltime employment, college placement, and appreciation of and sensitivity to the environment.

The presentation will summarize ICMP school-year programs, briefly describe the seven magnet summer school programs, and will detail the phenomenal success of the Marine and Environmental Internship Summer Program where minority high school students are placed with mentoring marine scientists or natural management professionals. The interns earn a salary as well as credit towards high school graduation while they investigate career possibilities in fields that, at present, have few minority role models.

THE TRAJECTORY OF STS IN AMERICAN EDUCATION

Rustum Roy
The Pennsylvania State University
University Park, PA

The evolutionary path which STS has taken in its emergence as an academic field within the University and the K-12 institutions is unique. The beginnings of STS were not at the frontiers of research as indeed were all the other new fields usually mislabeled as disciplines. The latter were born out of the sheer necessity to keep a lid on the volume of narrowly configured learning, which was allegedly necessary to "specialize" and obtain Ph.D.s. In most cases, with the passage of time, the subject matter enlarges still further, and soon masters degrees, and bachelors degrees, are also starting in the new field. In a decade or two some of the material sometimes shows up (albeit not as a labeled discipline) within K-12 education.

The STS trajectory has been very different. Much of it was started by learned, though not specialized, citizens who called attention to the BIG issues that confront society--from the environment to nuclear war to genetic manipulation. STS entered the university world mainly at the undergraduate level and the K-12 world almost at the same time. STS has since diffused throughout the educational system making connections with pre-existing pockets of STS-like concerns (e.g. the entire field of environmental education, science fiction, science policy, and so on).

In 1988, STS is established as the umbrella field formally bridging Snow's two cultures. It is clearly the intellectual core of the general education of every college student in the country. At the K-12 level, STS is contemporary civics or education for citizenship--a task any culture today rejects at its own peril. At the University level, it is the re-creation of the Uni-versity within the multi-versity.

LEARNING BY DESIGN

Alan Sandler
American Institute of Architects
Washington, DC

A hands-on exploration of how we learn, perceive, and make decisions about the built environment. The session participants will discover their teaching/learning styles, explore the design process as a decision-making tool, and experience the process of locating local resources for classroom use. The presentation includes group discussions, video and slide presentations, hands-on experiences, and options for self-discovery and personal use of materials.

TOWARDS LOCAL SPECIFIC PROGRAMS THROUGH AN EE BANK

Kartikeya V. Sarabhai and Meena Reghunathan
Center for Environment Education
Thaltej Tekra, Ahmedabad, India

The center for Environment Education (CEE), India was set up in 1984 as a national facility to play a lead role in developing EE programs and materials. Since India is a country which is culturally and environmentally diverse, a strategy had to be evolved through which local capability of developing EE programs and materials would be enhanced rather than one of producing and supplying standardized materials from CEE.

During the initial years, training in EE to NGOs and primary school teachers for conducting programs in schools has been done through nationwide teacher training programs co-ordinated by CEE. Educational modules have also been prepared by the Center. A network which would have NGOs and schools (at least one in each of India's 440 districts) has been initiated.

The Center is now working on making available EE materials through a computerized bank that would enable teachers and NGOs to develop local environmental materials and programs drawing on the experience a vast array of activities, programs and resources already developed. Initially it is planned to offer the facility through Regional Cells being set up by the Center. The paper will discuss the model and how the program has been initiated.

WETLANDS AND WASTEWATER -- A NATURAL SOLUTION

Susan Schuerger
City of Orlando Park & Recreation Department
Orlando, FL

Wetlands provide valuable ecological resources. Beside creating habitat for fish and wildlife, wetlands help maintain good water quality by removing nutrients and naturally purifying the water. To address problems with wastewater and disposal systems, Orlando is the site of the nation's first large-scale manmade wetlands.

Located in east Orange County, this artificial wetlands filters water from Iron Bridge Water Treatment Facility on its way to the St. Johns River. Within the wetlands, three distinct vegetative communities were planted to act as a filtration system for the highly treated water. The plant communities include: a 420 acre wet prairie; a 380 acre mixed marsh; and a 400 acre hardwood swamp. Bordering the wetland system are 400 acres of a natural wetland hardwood hammock. The 1600 acre facility provides a wildlife refuge for many bird and animal species including endangered species such as the bald eagle, wood stork and blue indigo snake. In the first six months, the wetlands project has met all of its objectives with the development of future wetlands a strong possibility.

The Orlando Wilderness Park is located within the City's manmade wetlands and provides hiking, primitive backpack camping, jogging, photography, and nature study and appreciation. Interpretive displays and brochures describe the wetlands, wilderness trails, bird and animal species, and native flora.

This unique development provides the chance to observe flora, fauna and water in their delicate natural balance.

FLORIDA: SUNBELT POPULATION BOOM IMPACTS THE ENVIRONMENT

Judith Schultz
University of Cincinnati
Cincinnati, OH

The United States population, currently 245 million, has increased 17 million since 1980, an average of 2.1 million, 7% per annum. During the past and present decades, population shifts in the United States have been primarily in the direction of the southern and western sunbelts, including the State of Florida. Florida has grown 23% in population since 1980, surpassing Pennsylvania as the fourth most populous state, far exceeding the national annual growth. The presentation will explore the nature of Florida's dramatic growth, with emphasis upon environmental impacts to the state.

A REGIONAL SURVEY CONCERNING THE NEEDS OF MIDDLE SCHOOL TEACHERS IN REGARD TO SCIENCE-RELATED SOCIAL ISSUE INVESTIGATION

Patricia Simpson
Southern Illinois University
Carbondale, IL

Instruction focused on science-related social issues in environmental areas has been called for by environmental educators for over 20 years. Recently leaders in science education have entered this field by calling for a focus on Science-Technology-Society (STS) instruction.

In the spring of 1988 a survey was conducted of middle school teachers in western Kentucky and southern Illinois to assess their perceptions in regard to a set of science-related social issue goal statements. The goal statements were an adaptation of those produced by Hungerford, Peyton and Wilke (1980) which address the development of knowledge skills and attitudes in students as a result of training in issue investigation.

In this presentation one of the researchers involved will present the results of this study regarding teacher perceptions of their understanding of the goals, their belief that the goals are an important component of every student's education, their possession of the knowledge and skills needed to assist students in achieving the goals and their need for curriculum materials and inservice programs to help them meet the goals as stated.

CROSS CULTURAL ENVIRONMENTAL EDUCATION PROJECT

Lorraine Sinclair
Environmental Resource Centre, Edmonton
Alberta, Canada

This project, developed by Native Canadians, attempts to foster an awareness of the need for greater balance in human-environmental relations in Canadian society. Native teachings provide one model for land management with a social and environmental conscience. Successfully practiced for thousands of years, the Native land management system was centered on the perception of themselves as an extension of Mother Earth.

The goal of this program is to enhance existing environmental educational materials with Native cultural materials. Since there is scant information on Native use of resources and management techniques for many areas, this material needs to be developed through community-level research. This process of developing the research material is of equal importance to the project as the actual content. It is imperative that Native priorities and concerns are strongly expressed in the type of content used and in the way it is organized.

SEEKING SYNTHESIS IN EE AND ENVIRONMENTAL SCIENCE

D. Scott Slocombe
University of Waterloo
Waterloo, Ontario, Canada

Synthesis has long been a goal of the environmental movement. We seek to teach synthetic thinking in environmental studies programs, and to apply synthetic rather than reductionistic approaches in analyzing environmental problems. Why? The role and nature of synthesis are explored by focusing on the complementary activities of teaching critical thinking and seeking to understand the origins and nature of complex societal-environmental problems. Nine methods of teaching and applying synthesis are compared to evaluate their strengths and weaknesses in this context: multiple perspective, issue, actor, historical, and systems analysis; case-studies, role playing, negotiation/mediation, and Delphi. General characteristics of these approaches include multi-disciplinarity, a field orientation, and a focus on interactions and processes. Examples are drawn from teaching planning at the undergraduate and Ph.D. levels, and from analysis of sustainable development problems in western and northern Canada. Ultimately, teaching synthesis and seeking synthetic approaches are seen as key elements in efforts to balance analytic and synthetic approaches in the environmental sciences' encounter with uncertainty and change.

NEW JERSEY SHORE -- KEEP IT PERFECT

Marlena Gloff Straw and Tonya Oznowich
New Jersey Department of Environmental Protection
Trenton, NJ

Since New Jersey is the most densely populated state in the nation, there are enormous pressures on its coastal zone to accommodate development while preserving the natural beauty of its shore and the productivity of its estuary system. The New Jersey coast also supports one of the most important industries in the state--tourism.

The New Jersey Department of Environmental Protection has embarked on a massive public information and education program in an attempt to change attitudes and behaviors concerning the New Jersey shore and water quality. Participants will engage in a variety of activities and will be provided with up-to-date water quality data collected by New Jersey coastal monitoring services.

Activities will be selected from the following resources: New Jersey Shellfish Education Package; My work, My Water and My Teacher's Guide; New Jersey Outdoors Explorer; Solid Waste Curriculum Guide.

WIND, WATER & TREES

Harriet Stubbs
Acid Rain Foundation, Inc.
St. Paul, MN

A workshop in Air Pollutants Effects on Forest Ecosystems is one module of the USDA Forest Service Natural Resource Units. An overview booklet, slide/tape, curriculum and bibliography present current information from Europe and the United States. The activities can be used in classroom or non-formal settings.

DEVELOPING MEDIA FOR WILDLIFE & ENVIRONMENTAL EDUCATION

William Suchy
Florida Films
Gainesville, FL

During the past eight years research examining the public's views concerning wildlife and environmental education has universally recognized the importance of the film, television and video medias to promote public awareness, appreciation, understanding and action concerning simple as well as complex environmental issues. Environmental education in the classroom as well as the education of the public and politicians on the needs of wildlife and their habitats and how these needs relate to our own standard of living can be dramatically enhanced by the production and use of these visual medias. Making quality programs that meet the needs of environmental educators as well as using effective formats and methods of distribution of these programs is essential to the preservation of our natural heritage. In order to take advantage of the enormous pervasiveness, popularity and impact of these visual medias, creative, innovative programs must be developed and used. Through the use of video examples and research summaries this presentation will explore and demonstrate how to harness the impact of the television/film/video medias to help educate and influence children and adults to become more responsive to and action oriented toward environmental concerns.

CONSERVATION FRONTIERS: AN OPPORTUNITY FOR CULTURAL OUTREACH

Harold W. Thiele
Missouri Department of Conservation
St. Louis, MO

This state-wide program provides a system of activities and awards designed to cover a broad spectrum of conservation topics and practices. In this program, elementary and high school youth are given an opportunity through these projects to interact with a variety of neighborhood and community groups (hospitals, newspapers, local agencies, businesses, clubs, etc.) as they conduct surveys, share natural history information, set up exhibits, write articles and in numerous other ways provide opportunities for themselves to relate the use of natural resources to the attainments and activities of people in their community. During this process, these youngsters will hopefully develop a greater appreciation of our natural resources and with this appreciation should come a better understanding and value system relative to the economic, aesthetic and recreational benefits of our natural environment.

GARBAGE, IT'S EVERYONE'S RESPONSIBILITY

Mary Sue Topper
New Jersey Department of Environmental Protection
Trenton, NJ

Information, education and involvement are critical for the public's understanding of the diversity and complexity of waste management issues.

New Jersey is currently developing a wide range of materials and programs to address an issue that transcends all cultures, people of all races and all walks of life--garbage and its disposal. For example, our Solid Waste curriculum presents the issues for 4th through 8th grades and in addition presents "hands-on" activities, copy-me pages, research projects, background information and resources which lead to solutions.

BUILD-A-FIELDTRIP...A UNIQUE PROGRAM WHICH PROMOTES ENVIRONMENTAL UNDERSTANDING THROUGH HANDS-ON EXPERIENCE

Diane A. Vaszily
The Science Eye
Plantation, FL

During this session, we will share with participants our unique strategies for designing and organizing interdisciplinary environmental field experiences for all levels and ages. A variety of plans from one to thirty days will be shared. Techniques will be "experienced" by the participants in typical hands-on fashion so that they will be able to incorporate the strategies immediately.

The basic motivation behind our program is to increase the environmental perception of our present and future generations so that more attention will be focused on environmental values. As educators, we have a double responsibility...to develop environmental awareness in our children and to maintain it in ourselves. In our programs, experience is the link to perception, awareness and appreciation.

A GALAPAGOS CASE STUDY: DEVELOPING "DISCOVERY BOXES" FOR THE ISLAND SCHOOLS

Gay Ver Steeg
Charlie Darwin Research Station
Galapagos, Ecuador

Amrit W. Kendrick
Galapagos National Park
Galapagos, Ecuador

We wanted to reach from the Darwin Research Station to the local elementary schools with an environmental message. This goal was met through the development of "discovery boxes".

Using a background in science education implementation in cooperation with the staff of the Darwin Station, we chose appropriate Galapagos themes for the boxes which would connect the activities within each box. We developed activities using all areas of the curriculum including science, art, music, drama and math. All activities had to be adjusted to the Galapagos environment and translated into Spanish. Teacher workshops were held to demonstrate the use of the materials, to emphasize the philosophy of participatory education, and to allow for teacher feedback.

Upon leaving the Galapagos Islands we felt successful on at least these three levels:

1. The Darwin Station education staff had been trained in the development of "discovery boxes".
2. Parent support for using the boxes in the schools was high.
3. Teachers and students were looking forward to using the materials.

A tiny but significant step has been taken towards increasing the awareness of the local school children about their unique environment. A good beginning.

OPTIONS FOR TEACHING ENVIRONMENTAL ISSUES IN THE CLASSROOM

Trudi L. Volk
Harold R. Hungerford
Southern Illinois University
Carbondale, IL

Research shows rather dramatically that student behavior concerning environmental issues will change if certain conditions are met. Research also shows that these conditions are not always brought to criterion by classroom teachers. Given that classroom teachers are concerned about changing student behavior with respect to environmental issues, a four-level instructional format is presented which has been shown to get young citizens involved in the evaluation and remediation of environmental issues.

Further, this four-level instructional model has been applied to strategies for dealing with issues in both intermediate and secondary schools. At the intermediate level, a teacher-led approach has been designed whereas at the secondary level, a teacher directed/student oriented approach is utilized. In excess of 100 teachers have been trained in these approaches with the assistance of the National Science Foundation. Both of these strategies will be presented as well as the research findings associated with their implementation.

INVESTING IN A RICH NATURAL AND CULTURAL HERITAGE

Heather Walter
Department of Culture, Recreation and Youth
Newfoundland, Canada

The province of Newfoundland and Labrador lies on the northeastern periphery of North America. Its whole social, economic, and cultural heritage is deeply rooted in the life of the outports--small rural and generally coastal communities throughout the island. These outports were originally settled for purposes of harvesting the abundant and varied natural resources of land and sea. The traditional settlements remain; however, some of the links between resources and employment and income have weakened over the last quarter century.

The Newfoundland 4-H Youth Leadership program is embarking on an extensive resource education project for young people in these communities. Its goal is to foster an awareness, appreciation, and understanding of the province's natural resources, and also to encourage leadership development and a sense of pride in the rich natural and cultural heritage of this unique province.

The province will follow the 4-H motto "learn to do by doing", as we explore activities, Newfoundland songs, and natural artifacts from the first two environmental education manuals. Come and share in the nature and culture of Newfoundland.

MOSQUITO CONTROL/ENVIRONMENTAL EDUCATION: A MODEL FOR SUCCESSFUL SCHOOL/BUSINESS PARTNERSHIPS

Neil V. Wilkinson
School Board of Lee County
Ft. Myers, FL

This presentation would provide a brief overview of the first year of an innovative Environmental Education Program paid in full by an area Mosquito Control District. A local Mosquito Control District decided to fund a teaching position through the Environmental Education Program of a local school system. The teacher teaches students in the classroom, a five period program, explaining the biology, morphology, and ecology of mosquitoes, the relationship between mosquitoes and man (especially the mosquito health related problems of third world cultures) and research related to improving control of mosquitoes in the United States and abroad. The uniqueness of this program lies in the funding. It is a model for school districts and other agencies to seek outside funds for the purpose of increasing environmental education goals in a time of limited funding for such programs.

HOMEOWNERS' MANAGEMENT OF GYPSY MOTH: EVALUATING COMMUNICATION EFFECTIVENESS

Charlotte Young
Argonne National Laboratory, Energy, and
Environmental Systems
Argonne, IL

As environmental problems continue to become more prevalent and severe, "ordinary people" must become involved in environmentally appropriate behavior. One way to enhance this involvement is by effective communication. Yet, communication about environmental problems are often ineffective. Hence, this study was designed to evaluate the effectiveness of information about the gypsy moth in Michigan. Seven different brochures on the gypsy moth were developed to enhance citizens' motivation and knowledge of the gypsy moth. These brochures were distributed to a stratified sample of homeowners in three cities in Michigan. The data suggest that respondents' knowledge of the gypsy moth was significantly different across brochure types. On the other hand, preliminary analysis suggests that previous exposure to the gypsy moth is only marginally important to developing motivated and knowledgeable respondents. The presentation will focus on the results of the study, and implications for fostering environmentally appropriate behavior.

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